Intel Dual-Core Pentium D Extreme Edition | NVIDIA nForce4 For Intel Chipset | 11 Digital Cameras Reviewed

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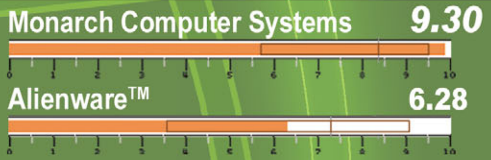

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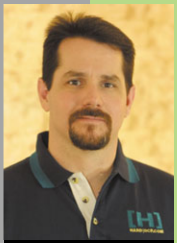
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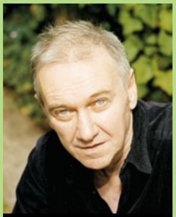
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Infinite Loops

Oddball items (or people) from
computing's periphery

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CORRECTIONS: May 2005 (page 9): D'oh, we said the release date of Longhorn was 1996, we really meant 2006.

GREETINGS FROM SAMITLAND

Believe it or not, summer's here already. Whether you have the need to jump in the pool or read this issue under a palm tree is totally up to you. What we at *CPU* really like to do is frolic in work clothes all over campus. In fact, the proof is in the pudding: check out this month's "Infinite Loops" to see what a swell time we had. Wife Julie called us "Bizarre," but I think she meant that as a compliment. Feel free to don some office attire and do some scampering of your own if want to join in the fun. Give it a shot. And speaking of shots (like that segue?), it's a great time to head out to shoot photos. To that end we take a close look at some upscale digital cameras on page 18.

Last month we spent quite a few pages on Linux and open source. That was a first. And this month is another first for us (based on the feedback I've picked up from you, our readers). We know and understand that not all power users are gamers or desktop crazy, and that's why we decided to delve deep into the realm of all-powerful workstations in relation to what we are all so versed in: PCs. Then we review some of the prebuilt rigs before building our own in the "Opteron vs. Xeon" article on page 64. Oh, that's with **dual dual-core** crème da la crème **Opterons**—just in case you were interested.

We've got some other early dualie coverage that I think you'll dig: A hands-on first-look at dual-core Intel Pentium Extreme Edition 840 (page 28), Anand and Kyle's columns (pages 32 and 34), NVIDIA nForce4 SLI Intel Edition (page 26), and plenty more that you'll see in coming months. Don't miss our modder project on page 37 where we show you how to convert an old LCD display into a cool picture frame to impress friends, family, and other tech geeks. Also, in this month's "Software Tips & Projects," you'll learn plenty of hands-on remote control dialogue.

Well, time I ended *this* dialogue. Things have been a wee bit bonkers, but I'm happy to say that wife Julie and I got back safe and sound from India. I managed to stop by Tokyo on the way home to eat some incredibly fresh sushi (mmmmm) along with a shopping visit to Akihabara, which was #8 in my Top 10 Wish List from the January issue (oh, and #4 from that list will be reality by the time you get the next issue of *CPU*). Between those two wish list items, I've got plenty to smile about. I'll see you next month!

Samit G. Choudhuri, Publication Editor, *CPU*

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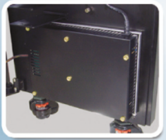
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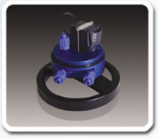
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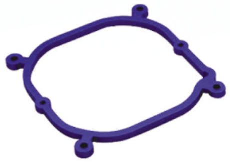

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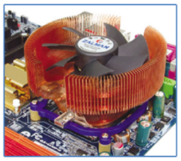

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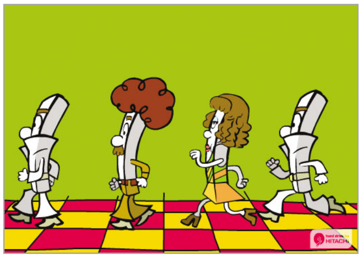
Pepper Pad:

Giant PDA? Midget Tablet? Monster Remote?

Somewhere between PDAs and Tablet PCs sits Pepper's (www.pepper.com) upcoming novelty: the Pepper wireless pad. This $949 knee-top PC is only 2.3 pounds and accepts input from both thumbpad QWERTY keys and a stylus for its 8.4-inch screen. The pad is meant to provide instant-on, highly portable access to broadband media over a Wi-Fi connection. MontaVista Linux and Java run atop a 624MHz Intel XScale CPU, including integrated browser, email, IM, and media playback clients. But here's the selling point, men: The Pepper pad also works as a remote control for your TV and home entertainment devices. A Web browser and a remote control? Wives, take cover, your nightmare scenario launches this spring. ▲

Hitachi Deskstars Will Be 1TB In 2007

With unique cartoon fanfare, Hitachi announced that its perpendicular recording technology will more than double current disk capacity with 20GB one-inch and 1TB 3.5-inch desktop drives by 2007. Unlike current technology, where the North/South magnetic poles of magnetically charged grains lay parallel to a hard drive surface, perpendicular recording stands these particles up to squeeze up to 230Gb of data onto one square inch of disk space. To illustrate its point, Hitachi produced a novel "Schoolhouse Rock"-style Flash presentation (www.hitachigst.com), "Get Perpendicular," in which clueless data bits learn to stand up and dance. Toshiba also uses perpendicular recording in its upcoming 80GB 1.8-inch drive for music jukeboxes, but we have to hand it to Hitachi PR; you just don't see a hard drive cartoon every day. ▲

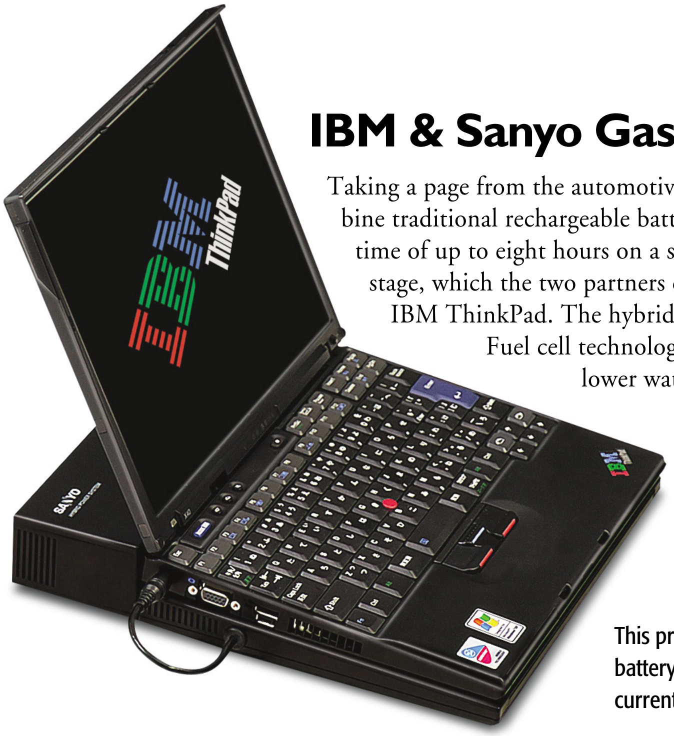


Ominous!

Double The Power, Quadruple The Fun

You'll swear you're seeing double when you open VoodooPC's (www.voodoopc.com) latest monster rig, the Omen d:221a. Yup, those are two AMD Opteron processors in there, right next to the support for two x16 PCI Express NVIDIA video cards in SLI configuration. There are twin SATA II drive ports (notice the "dual" theme developing here) and even two LAN and FireWire ports. What can you do with such double-barreled power? VoodooPC says the two NVIDIA cards can drive up to four Apple 30-inch displays and run a 15,000rpm SCSI drive on the embedded Ultra U320 support. The liquid-cooled, soundproofed Omen could give you dual sticker shock, however. A bare-bones version starts at $4,774, with fully tricked out models scaling to $12,000 and beyond. ▲

Like the Noah's Ark of PCs, everything travels in pairs on the new Omen d:221a from VoodooPC: CPUs, video cards, SATA II, LAN, and FireWire ports.



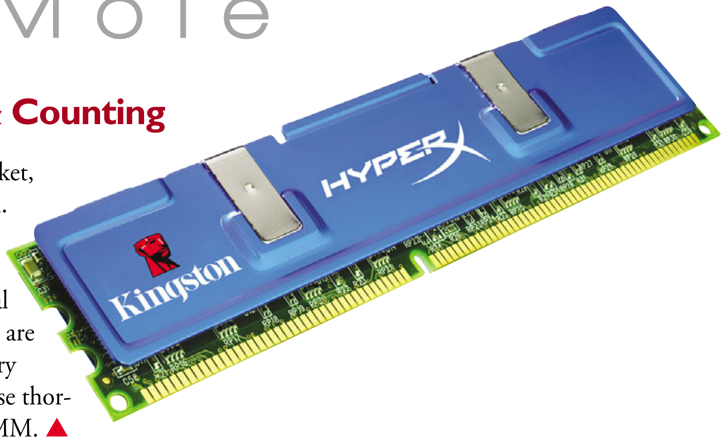
IBM & Sanyo Gas Up The ThinkPad

Taking a page from the automotive industry and its hybrid cars, IBM and Sanyo will combine traditional rechargeable batteries and methanol-based fuel cells to give laptops a run time of up to eight hours on a single charge. The technology is already in the prototype stage, which the two partners demonstrated recently on an unmodified, current-model IBM ThinkPad. The hybrid battery would require no redesign of IBM's laptop line. Fuel cell technology combines oxygen and hydrogen to create power but at a lower wattage. The traditional polymer piece of the hybrid helps the fuel cell achieve the wattage needed for peak laptop performance. IBM and Sanyo expect hybrid batteries to reach the market in 2007 or 2008. ▲

This prototype power unit combines a traditional laptop battery with a methanol fuel cell to run an unmodified current model of the IBM ThinkPad.

Hardware Mole

Kingston's HyperX Now At 750MHz & Counting



Claiming to be the first to bring 750MHz memory sticks to market, Kingston began shipping the HyperX DDR2 PC2-6000 in April. In lab tests the new modules ran reliably at up to 866MHz with latency timing set to 4-4-4-12-1, according to the company. The HyperX memory operates on 1.9 volts and cuts typical power consumption in half. All modules have heat spreaders and are rated to operate at up to 55 degrees Celsius. Even though memory prices continue to plummet, you will still pay a premium for these thoroughbreds: $221 for a 512MB DIMM and $286 for a 1GB DIMM. ▲

Seagate 120GB Notebook HDs Get Momentus

We admit it, we've been thoroughly spoiled by full-powered, big-screen notebook computers that make no compromises. So we welcome super-sized drives such as Seagate's new 120GB 2.5-inch hard drive. Running at 5,400rpm, the company claims its latest Momentus drive consumes no more notebook power than even slower drives. A 100GB model runs even faster, at 7,200rpm. Both models are SATA devices that also withstand up to 250G of shock during operation. Seagate's is the largest notebook hard drive available, but we're already thinking of ways to fill it up. ▲

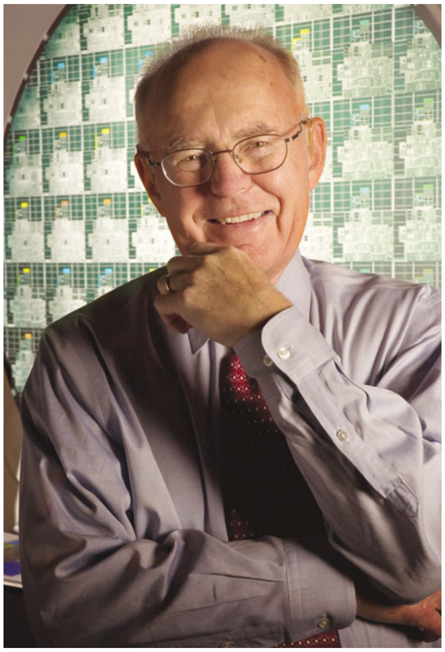
Sony On The Brain

Some games can really get into your head, but Sony is already considering the next eerie level, where ultrasonic signals will transmit sensory experiences, such as sound and smell, directly to your brain. A patent recently awarded to a Sony scientist describes a technology in which a "pulsed ultrasonic signal alters the neural timing of the cortex" to produce sensations. The technology could be used both medically, to help the impaired regain some lost sensation, or in games, to create hyper-realistic immersion in an environment. Why "get into the game" when the game can get into you? ▲

Compiled by Dean Takahashi

Rambus Finds Way To Quadruple Memory Performance

Microprocessors are just beginning to benefit from the concept of multithreading, or running more than one software program, or thread, at a time. Rambus plans to apply that concept to DRAMs. In doing so it could quadruple the speed of memory for a variety of applications. A conventional memory chip fetches 32 bytes of data at a time. This often means that a large amount of memory is used to deliver a small amount of data that a processor needs. Rambus will refine that with "micro-threading," or fetching eight bytes of data at a time. By operating on data in smaller chunks, the memory can busy itself with four different tasks at once in the same time it took to fetch one chunk of memory before. This quadruples the speed of memory performance, all with minimal changes to a DRAM interface and memory controller, says Craig Hampel, director of architecture at Rambus in Los Altos, Calif. Ideal applications for this microthreaded memory include 3D graphics, network routing and switching, and advanced video imaging. The company hasn't announced when it will make the technology available to its licensing partners, but Hampel says the typical design cycle for an invention such as this is a couple of years. This means the technology may hit the market around 2007. ▲



Moore's Law Hits 40th Anniversary

Gordon Moore predicted 40 years ago that the number of transistors on a chip would double every year. A decade later, he revised that to the number of transistors doubling every two years. The former Intel CEO's prediction has stood the test of time. In 1971, Intel put 2,300 transistors on its first 4004 microprocessor. This year it will put 1.7 billion transistors on its latest Itanium microprocessor. Furthermore, Paolo Gargini, an Intel fellow, says that Intel will likely be able to stretch its current silicon manufacturing techniques and extend Moore's Law for another 15 years. Another Intel fellow, Shekhar Borkar, says that even if chipmakers can put 100 billion transistors on a chip, there would still be an appetite for more computing power. Among the tasks he says will consume all those transistors are recognition tasks such as vision or speech recognition, complex data-mining tasks, and maybe the "Star Trek" Holodeck. ▲

Cypress Has High Hopes For Silicon Solar Cells

Cypress Semiconductor's SunPower division has high hopes for silicon solar cells. In the past few years, these cells have become more efficient at converting sunlight into electricity. T. J. Rodgers, CEO of Cypress, says that the company's sales of solar cells could grow from $80 million in 2005 to $400 million in 2008. The company has built a new factory to make solar cells in the Philippines, and it has already sold out all of its capacity for 2005. This is because its silicon solar cells are more than 21% efficient (in 2001 cells were only 13% to 15% efficient). With the better efficiency and the high-volume manufacturing, solar power is becoming a better bargain. Add to that tax subsidies that governments such as Germany, Japan, and the United States are giving, and the grow-your-own power solution is looking more attractive to both homeowners and office building owners. ▲

Watching The Chips Fall

Here is pricing information for AMD and Intel CPUs.

Released	Original price	Current price	Last month's price
AMD Athlon 64 2800+			
1/6/2004	$193**	$106	$109
AMD Athlon 64 3400+			
1/6/2004	$417**	$209	$207
AMD Athlon 64 3500+			
6/1/2004	$500**	$255	$245
AMD Athlon 64 3700+			
6/1/2004	$710**	$322*	$322*
AMD Athlon 64 3800+			
6/1/2004	$720**	$365	$370
AMD Athlon 64 4000+			
10/19/2004	$729**	$529*	$499
AMD Athlon 64 FX-53			
3/18/2004	$733**	$727	$727
AMD Athlon 64 FX-55			
10/19/2004	$827**	$813*	$849*
Intel Pentium 4 3.2GHz 800MHz FSB 1MB cache			
2/2/2004	$278**	$199	$214
Intel Pentium 4 3.4GHz 800MHz FSB			
2/2/2004	$417**	$255	$271
Intel Pentium 4 Extreme Edition 3.4GHz 2MB cache 800MHz FSB			
2/2/2004	$999**	$999*	$899*
Intel Pentium 4 Extreme Edition 3.46GHz 2MB cache 800MHz FSB			
11/2/2004	$999**	$985*	$995*
Intel Pentium 4 Extreme Edition 3.73GHz 2MB cache 800MHz FSB			
2/21/2005	$999**	$1,067*	$1,100*
Intel Pentium 4 520 2.8GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$178**	$150*	$163*
Intel Pentium 4 540 3.2GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$278**	$200*	$224*
Intel Pentium 4 550 3.4GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$417**	$280*	$305*
Intel Pentium 4 560 3.6GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$637**	$412*	$416*
Intel Pentium 4 570 3.8GHz 1MB cache 800MHz FSB 90nm			
11/15/2004	$637**	$699*	$698*
Intel Pentium 4 630 3GHz 2MB cache 800MHz FSB 90nm			
2/21/2005	$224**	$223*	$233*
Intel Pentium 4 640 3.2GHz 2MB cache 800MHz FSB 90nm			
2/21/2005	$273**	$276*	$277*
Intel Pentium 4 650 3.4GHz 2MB cache 800MHz FSB 90nm			
2/21/2005	$401**	$406*	$389*
Intel Pentium 4 660 3.6GHz 2MB cache 800MHz FSB 90nm			
2/21/2005	$605**	$587*	$599*

*** Retail price**

**** Manufacturer's price per 1,000 units**

Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com

Compiled by Trista Kunce

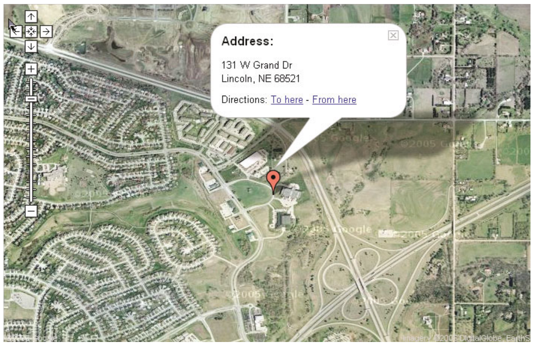
Our New Blue, Underlined Tattoo

We find many ways to express ourselves here at *CPU*, but lately we've been thinking about tattoos, spray paint, chalk, and blue ink. Why? Grafedia (www.grafedia.net). This interactive project lets you express yourself in real life and on the Internet by connecting these two worlds. It's as easy as tattooing, spray painting, chalking, or marking a word or phrase in a public place and uploading rich media content to the Grafedia Web site. However, here's the creative catch: You must always write your word or phase in blue and underline it. It's like a hyperlink for the real world. But, instead of clicking this link as they would in virtual space, people either send an email or text message to "blueunderlinedword"@grafedia.net to view an uploaded file. Let's say we decided to tattoo CPU@grafedia.net on our bicep underlined in blue. Next, for people to see a rich media file, we would upload an image on Grafedia's Web site. So, if you see our blue-tattooed arm as you pass us on the street, go home, and type the phrase into a blank email or text message; a few moments later, you'll receive the image we uploaded in your inbox or on your cell. Now, don't go gettin' any crazy ideas . . . ▲

New On The 'Net

Look To The Skies With Google

Last month we mentioned Google's new online maps (page 11). We didn't know "the coolest online maps we have seen yet" could get any cooler, but they have. Google just added a new feature to its online maps: satellite. Now Google Maps (maps.google.com) are beyond cool. As before, you can search for a location by typing in an address, business name/phrase (Pizza Hut or pizza near JFK airport), or directions, etc. Click Search and you'll see the Map view. But if you click the Satellite link in the top-right corner of the page, you'll get an awesome real-time sky view for the information you typed in. In addition, you can pan in any direction or zoom into or out of the image of your location. (*NOTE: You aren't able to zoom in too far in certain areas of the United States because Google doesn't have satellite imagery at all zoom levels.*) ▲

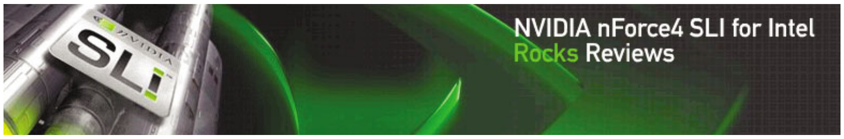


Address:
131 W Grand Dr
Lincoln, NE 68521
Directions: To here - From here

With Google Maps satellite feature, you get map views that are out of this world.

Zoning In On SLI

Win SLI prizes! That got us all giddy, so we decided we'd better check out the zone, the SLIzone, that is. On NVIDIA's newest Web site, SLIzone (www.SLIzone.com), MSI is sponsoring an SLI video contest. An offshoot of NVIDIA's nZone (www.nzone.com) Web site, SLIzone offers all the latest info on SLI technology. You get tutorials, news, reviews, system builder info, certifications, and . . . OK, you can win the contest by creating the best SLI video. You'll have to visit the site to check out the grand prize. ▲



Zone in on NVIDIA's new Web site at www.SLIzone.com.

What's Happening • Software

Compiled by Kevin Savetz

"Ring-ring" is so obsolete. Magix ringtone maker can turn your favorite songs into ringtones.

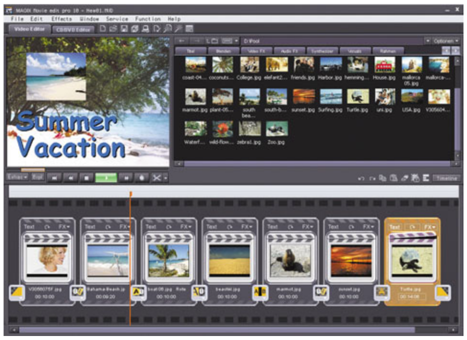
Phone Phun

If you refuse to pay a buck or two to download ringtones to your mobile phone, you might not want to buy this $20 product; however, the software puts a "magix" twist on ringtones: Create your very own. Magix ringtone maker (www.magix.com) lets cell phone addicts create their own ringtones from CDs and MP3s or from their own voice. Music loops and effects processing let you create your own rings, too. Now talkative people will have a litany of new rings to annoy us. ▲

Sounds Good To Us

While we're on the subject of making things work better, the ability to listen to hours of MP3s while you work is wonderful. But what isn't so wonderful is the effect tiny computer speakers can have on your music. Because your boss won't let you replace the little speakers in your cubicle with a 5.1-channel surround-sound setup, your next best option may be Octiv Volume Logic digital remastering software.

Volume Logic ($19.95; www.octiv.com), formerly available only for iTunes, is now available for Windows Media Player, RealPlayer, Musicmatch Jukebox, and Winamp. As your music software plays your tunes, the program remasters audio in real time, boosting low-level sounds, equalizing, and performing "spectral balancing" without modifying your files. The result is better sound from little speakers. There's no guarantee that your boss will appreciate the difference, however. ▲



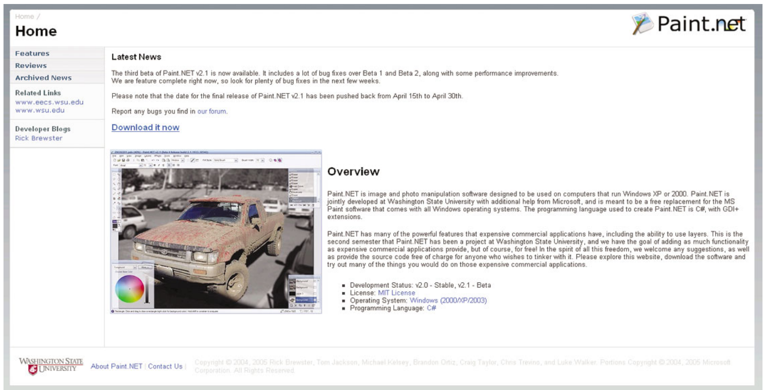
Edit home videos and then export them to surround-sound 16:9 DVDs with Movie Edit Pro 10.

Practice Makes Perfect

Before you start your own TV channel, maybe you should practice by editing your home movies and vacation videos into tolerable, perhaps even enjoyable, segments. Magix Movie Edit Pro 10 ($59.99; www.magix.com) lets you capture video, edit it, and burn your creations to DVD. Its editing features might not turn you into the next Spielberg, but the antishake filter and automatic image correction could at least make you look competent with a video camera. Best of all, the movies you create with it will be compatible with the high-tech electronics in your living room. The software imports high-definition video from HDV, HDTV, DVB, and WMVHD formats, handles a 16:9 aspect ratio, and supports surround sound. ▲

A Better Paint

The students at Washington State University know what we've all known for years: Paint, the little graphics program that's included with Windows, is pretty much worthless. So they went and did something about it. Paint.net (www.eecs.wsu.edu/paint.net) is a free photo-manipulation program for Windows 2000/XP. With features such as red-eye reduction, layer editing, the ability to import directly from a scanner, and more, the program may be perfect for digital photographers who don't want to learn complex applications such as GIMP or Photoshop. It's a trim little program (the download is only about 5MB), but you'll need to install Microsoft's .NET framework (if you don't already have it), and that baby weighs in at almost 24MB. ▲



Latest News

The third beta of Paint.NET v2.1 is now available. It includes a lot of bug fixes over Beta 1 and Beta 2, along with some performance improvements. We are feature complete right now, so look for plenty of bug fixes in the next few weeks.

Please note that the date for the final release of Paint.NET v2.1 has been pushed back from April 15th to April 30th.

Report any bugs you find in our forum.

Overview

Paint.NET is image and photo manipulation software designed to be used on computers that run Windows XP or 2000. Paint.NET is jointly developed at Washington State University with additional help from Microsoft, and is meant to be a free replacement for the MS Paint software that comes with all Windows operating systems. The programming language used to create Paint.NET is C#, with GDI+ extensions.

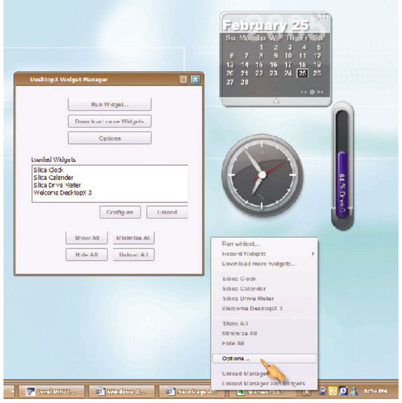
Paint.NET has many of the powerful features that expensive commercial applications have, including the ability to use layers. This is the second semester that Paint.NET has been a project at Washington State University, and we have the goal of adding as much functionality as expensive commercial applications provide, but of course, for free! In the spirit of all this freedom, we welcome any suggestions, as well as provide the source code free of charge for anyone who wishes to tinker with it. Please explore this website, download the software and try out many of the things you would do on those expensive commercial applications.

- Development Status: v2.0 - Stable, v2.1 - Beta
- License: MIT License
- Operating System: Windows (2000/XP/2003)
- Programming Language: C#

Copyright © 2004, 2005 Rick Brewster, Tom Jackson, Michael Kelsey, Brandon Ortiz, Craig Taylor, Chris Trevino, and Luke Walker. Portions Copyright © 2004, 2005 Microsoft Corporation. All Rights Reserved.

Windows Tweaks

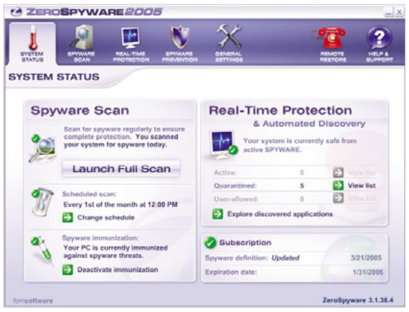
If you're a Windows user who's a little jealous of the Dashboard feature in Mac OS X 10.4 (Tiger), check out DesktopX 3.0 ($14.95 for end users; www.desktopx.net). The program lets you add widgets, desktop themes, and objects to your Windows Desktop, which deliver personalized information such as custom weather monitors, stock tickers, news readers, MP3 players, and calculators. The program is extendable, which lets everyone build his or her own widgets, and a complete scripting guide is also available to get you started. ▲



With Desktop X cool but informative widgets grace your Windows Desktop.

Spyware Help

FBM Software's release of ZeroSpyware 2005 ($29.95; www.fbmsoftware.com) includes a feature the company says is a spyware first: help from a human when you need it most. The software includes 24/7 spyware removal assistance. When spyware makes your PC go wonky two hours before a deadline, someone will be able to talk you though the process of removing it—or just talk you down from the ledge. The Remote Restore feature lets a technical support rep diagnose and troubleshoot the program live. But hopefully spyware won't get installed in the first place because the program's Vulnerability Scanning and Intrusion Detection features should stop the problem before it starts. ▲



Scan for spyware regularly to ensure complete protection. You scanned your system for spyware today.

Scheduled scan: Every 1st of the month at 12:00 PM

Spyware immunization: Your PC is currently immunized against spyware threats.

Your system is currently safe from active SPYWARE.

Active: 0
Quarantined: 5
User-allowed: 0

Spyware definition: Updated 3/21/2005
Expiration date: 1/31/2006

ZeroSpyware includes human tech support when you need it most.

Turn Your Life Into Bizarro World

Having spent many hours idly wondering which comic book superhero power we would choose, we instantly took interest in Comic Life for Mac OS X. Comic Life ($39.95; plasq.com) won't give you superhero powers, but it will let you turn ordinary photographs into nifty digital comics. Drag your photos into the ready-made layouts, add speech bubbles and graphic effects, and you have instant hilarity. From there you can save your comics to the Web or print them out. Besides comic strips, you can use this software to make greeting cards and story books. Our plan is to make some cartoons to prove which is the better superpower, invisibility or X-ray vision. ▲

A DEVELOPER'S LIFE
WHAT'S THAT CRAPPY FORMULA?
TOMORROW...
NAH...
MAKE THAT NEXT YEAR!
SHOULD I QUIT SMOKING?
CREATIVE IDEAS
WHERE'S THAT STUPID KEY GONE?!?
DESPERATION
DEADLINES

It doesn't take much artistic talent to make comics with Comic Life, but a sense of humor does help.

BIOS Upgrades Available Online

Compiled by Kevin Savetz

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Readers can check out www.cpumag.com/cpujune05/bios to see our entire upgrade list.

Motherboard	Date Available	URL
ABIT AG8 3rd Eye	04/04/2005	www.abit-usa.com/downloads/bios/bios_revision.php?categories=1&model=203
ABIT AG8	04/04/2005	www.abit-usa.com/downloads/bios/bios_revision.php?categories=1&model=200
AOpen s661FXm-S	04/01/2005	download.aopen.com.tw
ASUS K8U-X	04/07/2005	www.asus.com/support/download/item.aspx?ModelName=K8U-X&Type=BIOS
Chaintech MPM800-3	03/22/2005	www.chaintechusa.com/tw/eng/Download/dl_desc.asp?DCSNo=4&PISNo=315
Chaintech SPT800-000LD	03/29/2005	www.chaintechusa.com/tw/eng/Download/dl_desc.asp?DCSNo=4&PISNo=306

DIGITAL ECONOMY

Compiled by Steve Smith

The Job Search

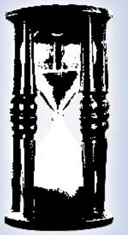
The Mickey Mouse phone is about to go mobile, and it looks like Disney needs a handset expert to make sure those ears won't dig into our necks. Walt Disney Internet Group plans to launch a line of cell phones for its many brands over the next three to five years, and the Magic Kingdom needs its own handset manager to steer the strategy, partner with cell phone suppliers, and provision up to $50 million per year in equipment purchases. Disney's ESPN brand already announced that it will launch its own mobile phone service this year, but the company may be looking beyond mini-football phones to target themed products to its many other family and teen segments. If you have five years experience in handset technology and development, you could be the individual who brings the Buzz Lightyear cell phone to the kid market. Or maybe you could just design a model that deciphers Donald Duck's intractable rants . . . and leaves him a text message: FTPOP! (Forgot To Put On Pants!)

RAW DATA

13 hours, 44 minutes, 4 seconds

Time spent online by the average U.S. Internet user in February 2005

Nielsen//NetRatings



58%

Percentage of Internet users who have deleted browser cookies from their systems *JupiterResearch*

54%

Percentage of parents who apply filters or monitoring software to their children's Internet access

Pew Trust

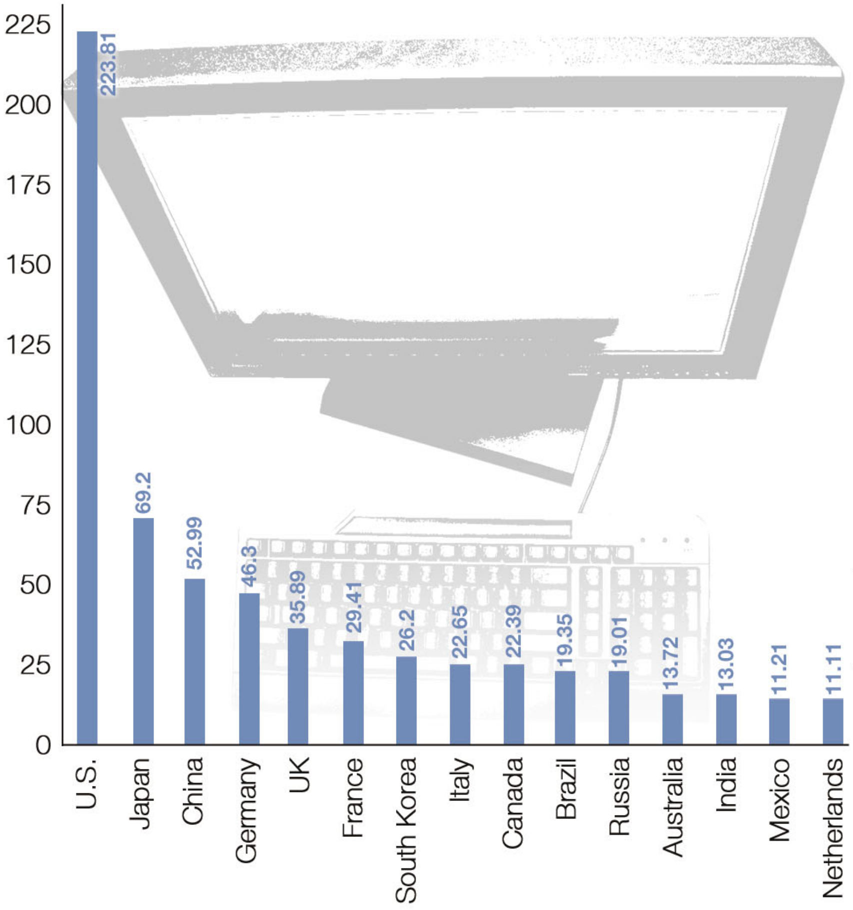
-2%

Decline in monthly time spent online in United States, Feb. 2004 vs. Feb. 2005

Nielsen//NetRatings

The United States Remains World PC Superpower

There are 820 million PCs in the world, and 27% of them are in the United States, according to the latest edition of the Computer Industry Almanac and its count of PCs by country. Notebook PCs now account for 24% of all PCs worldwide and 27% of in-use personal computers in the United States.



Source: Computer Industry Almanac

NexStar·3

EXTERNAL 3.5" HARD DRIVE ENCLOSURE

MIRROR FINISH | USB 1.1/2.0 | FOR 3.5" HDD | ALUMINUM CASE | PLUG N' PLAY

Form and functionality collide with style in the NexStar 3 External Hard Drive Enclosure from Vantec. With its mirror finish, sleek curves and bold colors, the Vantec NexStar 3 stands out from the crowd. The sturdy drive cage protects your hard drive while the aluminum case effectively draws away the heat, protecting your drive from overheating. The NexStar 3 also utilizes USB 2.0, offering speeds up to 480Mbps, 40 times the speed of USB 1.1! But if you are using USB 1.1, the NexStar 3 is still an ideal way to store and transfer large amounts of data. Available in 4 vivid colors (Steel Grey, Onyx Black, Brilliant Red and Midnight Blue), the NexStar 3 lets you store your personal data in an enclosure that matches your style!

Onyx Black   Brilliant Red   Midnight Blue   Steel Grey

newegg.com   PC CLUB   TigerDirect.com   ZipZoomfly.com   MICRO CENTER   Fry's Electronics Outpost.com

For more infomation on where to buy, please go to

http://www.vantecusa.com/wheretobuy.html

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Vantec Thermal Technology, Inc.
43951 Boscell Road, Fremont, CA 94538
Tel. 510.668.0368   Fax. 510.668.0367

Starting Fresh With Windows

The last few columns I've written have been diatribes against the mess Microsoft is making of Windows security. Of course it's always easy to criticize Microsoft, but it's much more difficult to explain how it could be doing things right.

Let's start with the premise that the Windows OS as we know it has to be junked. It was designed all wrong for the modern network-connected consumer and no patch can fix an architecture that was designed around assumptions that turned out to be mostly wrong. Windows XP is basically Windows NT, which was designed at a time when Microsoft was very focused on competing with Unix and mainframes for corporate dominance. It was thought by Microsoft at the time that a consumer OS was just a subset of an enterprise OS. The only networked world that anybody had extensive experience with was one that was contained within corporations and run by IT professionals in a highly controlled environment. "Security" meant not connecting the corporate network to the outside world and not letting users install software on their own. If a computer needed to be fixed, upgraded, or connected to a peripheral, that was the IT department's job.

Nobody imagined a world in which every consumer would have to be their own IT department supporting home computers connected to a completely open network flooded with a mixture of benign and malicious software. As it turns out a modern home computer's security needs are no "subset" of the enterprise, they are an entirely unique problem. Selling a stripped down Enterprise OS to consumers instead of an OS designed for consumers has resulted in much of the Internet turmoil we experience today. Trying to secure Windows as it is with a monthly burst of security patches is like trying to hold Jell-O together with rubber bands. Failing to control the flood of problems by simple means, Microsoft has been taking increasingly drastic measures to completely shut down OS functionality that it had previously promoted to consumers and its developer community.

What's worse is that Microsoft has thousands of brilliant engineers working round the clock to pour more gas on the proverbial fire. Consumers don't need a bigger, more complicated OS that achieves security through stringent restrictions on their use of the computer. What consumers need is easy to find in the most popular and widely used consumer computers in the world: game consoles. The features that make game consoles cheap, ubiquitous, inexpensive, secure, and reliable at running the most sophisticated and demanding computing applications consumers use (games) are simplicity and elegance.

What consumers need is not more giant, fragile OS features, but less.

Nintendo's GameCube, for example, is secure because it's not attached to a network and has no hard drive to corrupt. It can only run one application at a time, and all applications are published by a single trusted entity on encrypted media. Notice also that an Xbox which has 64MB of RAM and a 768MHz Intel CPU and 8GB of disk space still runs games as well or better than most modern PCs with five times the computing resources and cost. Why? There isn't a fat, sloppy OS in the way sucking up resources and obstructing efficient performance. The Xbox has a minimal Windows OS. Any OS services it doesn't include gets shipped as libraries *with* just the games that need them. There are no consumer applications that are in widespread use that are *more* demanding of computing resources than a video game, so any solution that works great for games, should work great for all the other trivial applications consumers also use.

Multitasking with real-time 3D graphics and audio, supporting four concurrent players Nintendo's way on a $100 children's toy with no OS.

Single-user text and image processing the Windows way on a $1000+ personal computer.

by Alex St. John

If we assume that we can't live without a network or a hard drive, we find that an Xbox also appears to be very secure. Why? Because Microsoft runs a closed network for the Xbox, and nothing can install itself on the hard drive over the network without an encrypted CD published by Microsoft giving it permission. This may seem restrictive, but there are some valuable ideas here that give us the makings for a better consumer OS. If all applications on your computer, including the OS, were encrypted by the publisher, then it's very difficult for a virus or spyware to infect the computer because each application would detect that it was corrupted on launch and presumably restore itself before proceeding.

If all applications ran in a protected memory sandbox, with access to the file system limited to their own resources, then it would be very hard for a malicious application to do any damage to a computer. This is basically the security feature that languages like Java achieve in software. Intel processors support this kind of sandboxing in hardware, but Windows does not make full (or correct) use of it to secure your computer. Properly hardware sandboxed you could browse and install software freely without worrying about damage to your computer or getting infected with software you couldn't easily remove. The fact that today Windows can't tell if it's corrupted and doesn't know what applications it has installed or how to remove them cleanly is a major design flaw for consumers.

In a hardware sandboxed environment, you wouldn't need a firewall because software couldn't install itself secretly and run all the time on your computer. You wouldn't need antivirus or anti-spyware software because the OS would know where all applications were, how to remove them, and if the OS or any other applications in the system had been corrupted. Software wouldn't be able to "spy" broadly because applications would only have access to their own data. Notice that nobody writes spyware or viruses in Java?

There are many obsolete OS ideas that have become entrenched in the Windows architecture that represent a growing body of unnecessary security, stability, and support baggage. Multitasking was an idea invented in an era when computing resources were scarce and access to an expensive CPU had to be shared among many users. Virtual Memory was invented when RAM was scarce. Even the Windowing UI paradigm was created to conserve scarce screen real estate at a time when monitors were small, low resolution, and expensive. Today RAM, CPU power, and increasing screen real estate are cheap and abundant. Does your game console need all this Windows stuff to play a game? Does your DVD player need it to play video, or your iPod to play music? Has viewing, editing, and sending text and images become so much more complicated that you need a computer more than 1,000 times more powerful than you did 15 years ago to do the identical things? Probably not. Why is your computer slow, insecure, and unstable? Because you're running an enterprise OS at home that devotes enormous resources to doing things you don't need and its own complexity is *the* security hole.

In the console world there is only one "legitimate" publisher for a console. This is how consoles enforce security, quality, and content standards and guarantee a profitable market for content developers on their platforms. Console owners such as Sony and Nintendo take a cut of all software sales on their platform and provide marketing and distribution support for their content partners. Microsoft has always had a tendency to think of itself as being in competition with all other successful software publishers on the PC. Any software business or "platform" that has shown profitable potential, well, Microsoft has claimed for itself. If Microsoft instead acted like a console company and created programs to certify market and distribute legitimate third-party software to its users instead of obstructing online distribution, it could create a very lucrative console-like publishing business for itself. As Sony has clearly learned, it doesn't have to make and own all the best games on its platform to make a tremendous profit; it simply has to set quality and security standards, enable distribution, and let the free market create the best products.

I'm not saying that Microsoft should become the exclusive software publisher and distributor for the Windows OS; only that it doesn't have to completely surrender consumers' online freedoms in the name of security. It isn't necessary to block downloads, constantly handle pop-up warning dialogs, download patches monthly, and burden the OS with virus and spyware scanners when the OS architecture can be "inherently" secure through simpler more elegant design. ▲

Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

Let's start with the premise that the Windows OS as we know it has to be junked.

Send your feedback to TheSaint@cpumag.com

DREAM HARDWARE

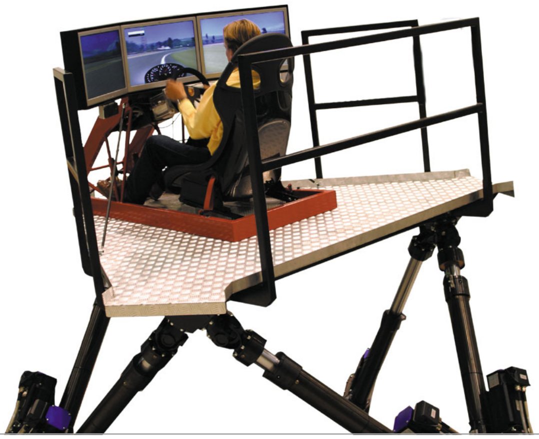
These Gizmos Don't Sing It, They Bring It

Sometimes a dream resembles your own life, only better. We're getting a lot of such vibes from the gadgets below. Some are objects familiar to any geek, yet enhanced in subtle ways. Another looks outlandish, but all in an effort to feel real. Hence, the prices make the whole experience feel slightly surreal. Yes, all those zeroes come before the decimal point, sir or madam.

by Marty Sems

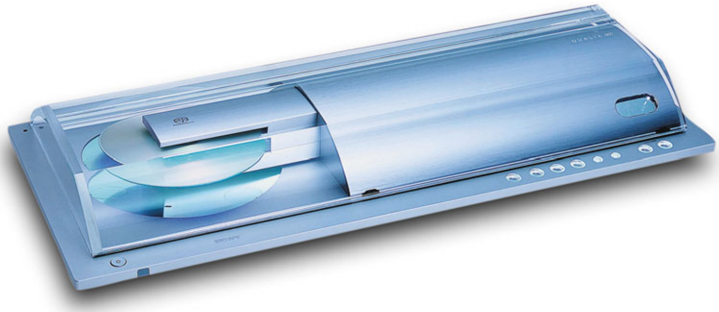
Mamiya ZD

The last time we visited 22-megapixel territory in this section, it came in the form of a camera back that could convert medium-format film cameras to ultra high-resolution digital (September 2003 *CPU*). This time such a colossal CCD comes in a digicam of its own. Mamiya's new ZD (www.mamiya.com) is an SLR that's compatible with the company's 645AF detachable lenses. It can snap a 12-bit frame and a half every second. The ZD has been in testing in Japan for a while, but it should be available here for between $10,000 and $15,000 as you read this. Meanwhile, Hasselblad's larger H1D offers a similar 22-megapixel resume but adds a 16-bit color depth and a 40GB external drive for approximately $22,000 (www.hasselblad.se).



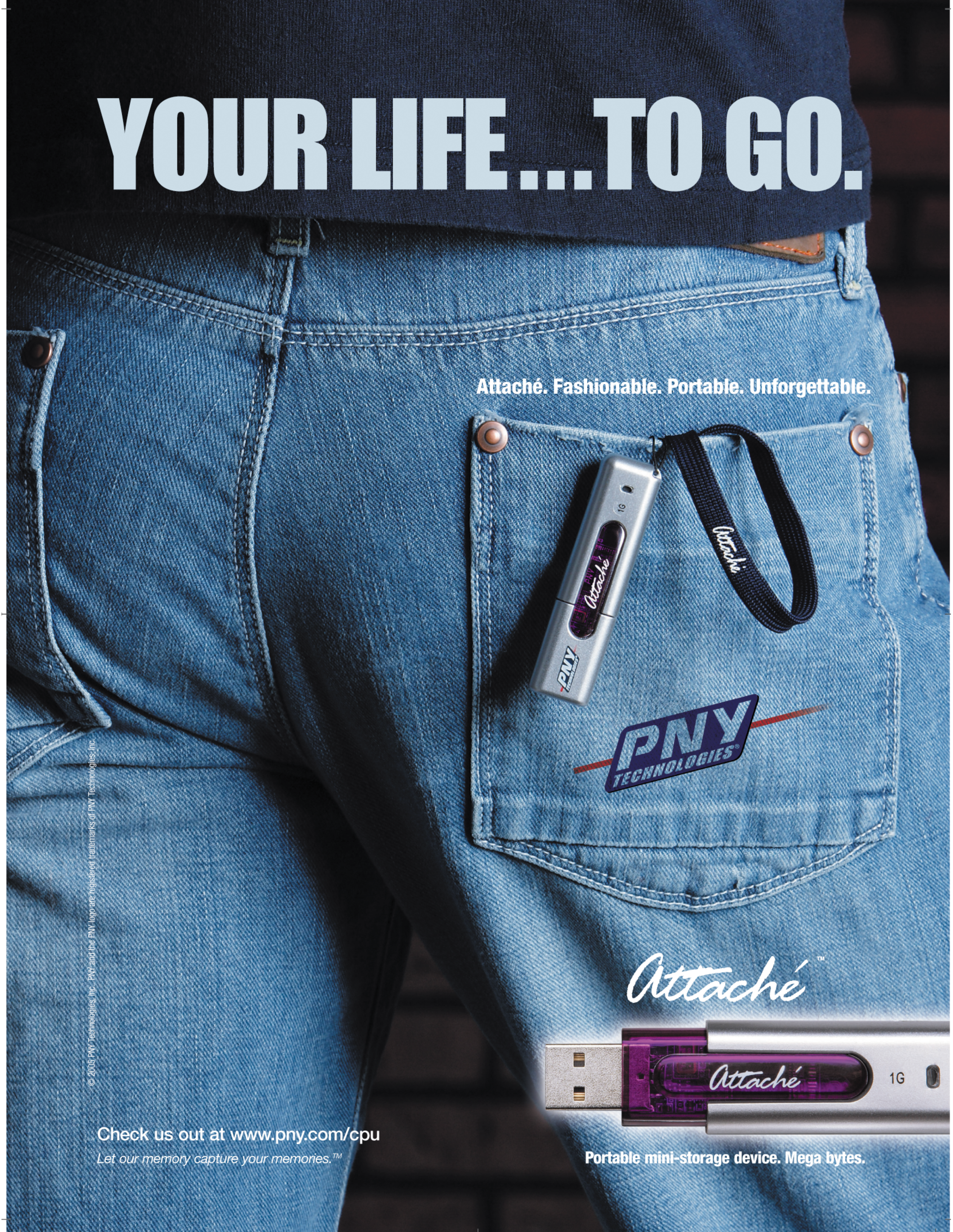
FCS Racing Simulation Hexatech

It's the mechanical bull for the NASCAR age. Take a lap in this amazing racing simulator from Holland and try not to get thrown from the vehicle (www.hexatechracing.com). The Hexatech rides on instantly responsive hydraulic rams for motion with six degrees of freedom. It's the last word in force feedback. Actually, this sim is more of a custom OpenGL multiplayer game, with skill levels ranging from arcade game-ish to realistic racing. THX Dolby surround sound fills in the rest of the experience. If the Hexatech with three 23-inch TFT displays doesn't make the track seamless enough for you ($230,000), step up to the one with the spherical projection screen ($300,000).



Sony Qualia 007

All Qualia products share a distinctive three-digit numbering scheme, so it's just a coincidence that this upscale Super Audio CD player snagged lucky number 007. Still, it does behave like something out of Q's spy gadget skunk works. Load a disc and the striking aluminum housing's cover slides shut. The 007 then raises the disc to the hybrid laser assembly and commences playback. Downstream, Sony's 75-watt S-Master dual-channel amp sends heartbreakingly clear 32-bit sound to maple-enclosed digital speakers constructed specially for the system. Transfer $12,500 from your secret account to a Qualia store in NYC or Las Vegas or call 877-QUALIA3 (www.sony.jp/products/Consumer/QUALIA/jp/products/007/index.html). And do try to keep your 007 in one piece.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Digging On Digicams

Focusing In On 11 Cameras For Power Users

We may not like to admit it publicly, but power users put their digital cameras in auto mode for point and shooting just like everybody else. The difference between a power user and a newbie is that power users will eventually take their cameras out of auto mode and capture photographs rather than snapshots. Imagine taking a close-up of a bee resting in a flower. A newbie would stand up straight, use the optical (and possibly digital) zoom to fill the frame as much as possible, and snap the shutter. A power user would jump into macro mode, use a low ISO setting to minimize grain, get on his knees to get close to the action, select shutter priority to capture the right amount of motion in the bee's wings, check the brightness distribution in the camera's histogram, and use exposure bracketing to get multiple options for the same shot.

If you're new to photography, that sounds like a lot of work, but it actually takes less than 15 seconds if you're familiar with the ideas and controls of your camera. It's certainly simpler than fine-tuning motherboard BIOS settings.

Three years ago, a roundup of midlevel consumer cameras would have meant an armload of 4-megapixel, rectangular units around $500, each with manual settings, mode presets, and image quality running from fair to good. We wanted to see what the midrange offers today's power users and what you gain by stepping up into the entry-level SLR (single lens reflex) category. Here's what we found.

How We Tested

Beyond hands-on experimentation, I ran two tests, one at night under controlled incandescent and candlelight conditions to test low-light performance (a weakness in consumer digitals) and one on an unfortunately heavily overcast and rainy day, forcing me to work outside under an umbrella. The upside was that lighting levels stayed fairly constant while shooting.

For night shots I set up a still scene and tested with flash, auto white balance, incandescent white balance, and auto white balance by candlelight, all shot in program mode to provide a common methodology with the lower-end cameras. Daytime shots included a near-black handset on a paper towel to see how well sensors preserved texture detail in adjacent bright and dark areas (another common difficulty for digitals). I performed time testing by photographing a stopwatch and tested macro functionality by shooting an extended tape measure. With no Macbeth color card available, I shot a row of Crayola crayons and viewed the results on a calibrated monitor.

Bushnell Outdoor Camera

I can't penalize Bushnell for trailing this pack in features. I was warned but decided to review it anyway as the only weather-resistant model here. I took it for a spin away from the umbrella, made sure it got good and wet, and found the rubber seals protected the battery (two AA); SD slot; and the video, USB, and DC ports. There's no mic or audio output. Bushnell says the camera would likely be fine from a quick, accidental dunk underwater, but it's not made for underwater shooting.

Lightweight and abundantly rubberized, the 3.2MP unit is predictably slow and has no optical zoom (4X digital). There are five white balance presets, exposure compensation from -2 to +2, and ISO settings from 100 to 400. Macro mode did a respectable job down to about three inches (a plus for nature shooting). You can choose from center or average metering, although the average mode doesn't show an icon on the 1.5-inch preview LCD.

The camera did surprisingly well in daytime tests, although flesh tones veered a bit into the red. In addition, in my shooting-from-power-on test, there was one instance where an opaque glass table, normally clearish-white, turned out purple. Bushnell struggled in the candlelight tests, producing an odd grid artifact throughout the illuminated area, and showed a propensity to overflash a scene. The camera's white balance for tungsten lighting was better than expected. Given a street price around $190, this is a good camera to beat around in the wild if you don't want to risk more expensive gear.

Canon EOS Digital Rebel

Until Nikon's $799 counter-attack arrives, Canon remains unchallenged in sub-$1,000 DSLR market. The 6.3MP Rebel's solid, plastic body is exceedingly comfortable, although the mirror "flap" is louder than most SLRs, and something did rattle a bit in my unit. SLR newbies will need to study the manual, but Canon did disable many manual capabilities, such as flash exposure compensation and white balance adjustment, so as not to compete with its more expensive 10D model.

Outdoor Camera
$299.95
Bushnell
www.bushnell.com

CPU CPU CPU

EOS Digital Rebel (300D)
$799
Canon
www.canonusa.com

CPU CPU CPU CPU C

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Surprisingly, the Rebel's white balancing, particularly in low light, was a bit lacking, but this was easily remedied by shooting in RAW and fine-tuning in the RAW decoder. (See our "Getting RAW" sidebar.) Color accuracy was excellent, although the best results came when not using the Program AE mode. The Rebel's imaging capabilities are excellent, but its onboard brains aren't always the best. The Rebel's lack of noise, though, even in low light at high ISO settings, is incredible, and the image clarity under such conditions was on par with Leica for $1,000 less.

Excellent features are everywhere. Shutter speeds range from 1/4000 to 30 seconds; the pop-up flash is higher than normal to reduce lens-barrel shadowing and red-eye; a depth-of-field preview button sits under the lens release; the camera uses a seven-point auto-focus system; and the focusing is lightning fast. Three processing modes can make images look more vivid or subdued. In addition to seeing a histogram after pressing the Info button during image playback, you can set the histogram to show automatically during the two-second post-shot review.

At press time some stores were selling the Rebel with an EF-S 18-to-55mm lens kit, camera bag, and extra battery for $769. Better value is hard to fathom.

Casio QV-R62

QV-R62

$299.99

Casio

www.casio.com

CPU CPU CPU CPU

Compact, feature-rich, and abnormally fast for its category, the 6MP QV-R62 looks and plays the part of a digicam for dummies, but there's quite a bit under its hood. The camera's chief drawback is its terrible low-light sensitivity. With a maximum ISO of 500, the QV-R62 all but requires a flash indoors, although exposures within 10 feet with flash are decent.

The viewfinder's barreling is quite pronounced, but you'll likely use the bright two-inch LCD for previewing. Casio provides for a live histogram display, a useful feature that's often absent in high-end cameras, as well as a live white balancing preview. The menus are easy to navigate, and Casio builds in feature-explanation screens.

The QV-R62 includes 23 Best Shot modes for those who want to rely on profiled shooting options. Among these is a Coupling Shot, which lets you take a picture of your companion in front of a scene, then have your companion shoot you in the same scene. The camera will combine the shots to make it look like a third party photographed you together.

Daylight performance was very strong, with crisp colors and a generally broad contrast range. The macro depth of field was a bit long, but Casio was able to shoot the subject of my overcast portrait in focus using auto mode. Street priced about $100 less than MRSP, the QV-R62 pretends to be an entry-level camera but in many ways will satisfy intermediate users.

Fujifilm FinePix S20Pro

The S20Pro is very comfortable to handle, yields good dynamic breadth, and has a generously fast burst mode. The camera's macro modes are incredible, focusing down to 1cm. The camera's ability to adjust ISO automatically for low-light conditions is also good, although perhaps too good because while it rendered our candlelight scene with considerable detail, the candle was turned into a white-hot blowtorch.

Fujifilm's controls are a bit awkward. The focus ring on the lens barrel is electronic, so it mirrors the slow response of W and T zoom buttons on the back. Most options are accessible via the main menu button in the center of the directional pad, but a separate F button accesses resolution, ISO, and B&W/sepia/normal color modes. A focus check button magnifies the center portion of the image during manual focusing, which is cool, but I prefer Panasonic's half-press on the shutter approach. Fujifilm does add additional indicators to let you know when focus is achieved, and a Shift button on the lens barrel allows for access to more functions. I'd rather see these in an expanded main menu than have to remember Shift+ combos, though.

This Fujifilm uses an EVF (electronic viewfinder), which replicates most of what you'd see with the LCD. Like many Fujifilm cameras, the S20Pro annoyingly defaults to ratcheting the lens continually to autofocus whatever the sensor is seeing, and the focus mechanism can be painfully slow. The S20Pro also lacks a focus-assist illuminator, which compounds the unit's focusing problems and resulted in times when I was forced to focus manually.

Add in that the S20Pro uses a 3.1MP sensor with another 3.1 secondary pixels for added dynamic range, and calling the camera 6.2MP is a bit of a misnomer. The clarity of a true 6MP image is obvious. The camera also wouldn't recognize my CF cards above 1GB due to incompatibility with FAT32, and it exhibited more noise under magnification than I thought tolerable in a high-end consumer camera. Not even playback histograms, robust manual settings, and a sub-$600 street price can make proper amends here.

FinePix S20Pro

$799

Fujifilm

www.fujifilm.com

CPU CPU C

HP Photosmart R717

All consumer cameras are point and shoot, but HP excels at making consumer

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Photosmart R717
$299.99
HP
www.hp.com

cameras so smart and loaded with post-processing algorithms that pictures practically jump off the screen. The 6.2MP R717 uses HP's Adaptive Lighting technology, which corrects high-contrast scenes to lighten shadows as the shot is being taken. This helps counter the camera's ISO 400 ceiling and yielded some shockingly clear indoor and low-light images, the best I've seen in a sub-$300 digicam. My flash tests didn't wash out, and HP's automatic white balancing is incredibly good.

It better be good because HP offers little in the way of manual tuning beyond low/medium/high-type controls for the most common elements. Instead, HP focuses on integrated features, such as advice on how to improve a shot, a 320 x 240 movie mode that actually looks decent, in-camera red-eye removal, and a killer panorama stitching routine that uses outline overlays of the prior shot to guide your next shot placement.

Despite HP's formidable noise removal, there was still some red noise in dark shadows, macro focus was undesirably long, and bright areas in close-in subjects tended to wash out. With no histogram, no RAW support, and limited menu options, this isn't a great fit for higher-end users, but it sure delivers stellar images for its price.

Leica Digilux 2

If you learned photography on a 1960s-to-1980s SLR, you'll love Leica's physical design, which has everything from a top-mounted shutter speed dial to f-stop, focal distance, and telephoto rings on the lens barrel. The camera is built like a tank, yet it has all the function, control buttons, and menus of a modern digital. You will also realize why the L-shaped handgrip-style became so popular; it's more comfortable, albeit perhaps less steady than Leica's two-handed design. The EVF might be tolerable if the resolution weren't so poor. And who designs a $1,850 camera with RAW support but no CF slot for Microdrives, never mind an internal buffer barely big enough to fit one RAW image?

Leica's been around too long to have completely missed the boat. You get a live brightness (not color) histogram. The built-in flash either pops up high on a Z hinge to fire straight on or snaps down to fire a 60-degree bounce flash. You can assign four menu functions to the directional pad as Favorites, and there are no program modes because anyone paying this much for a camera better not need them.

I noticed a little noise muddiness in high-contrast shadows, an ISO 400 limit crimping my candlelight images, and a macro mode that wouldn't focus below 12 inches. Otherwise, image quality was dazzling. Textures in objects and clarity of small text even at ISO 400 left all competitors in the dust. Even flash photos, which typically run a bit sterile, were dramatic and rich. Of these cameras, only the Digilux 2 would silence any film-beats-digital fanatic.

When aperture, shutter, and manual focus control become second nature to you, nothing will beat Leica's old-school lens

Getting RAW

In the days of film photography, if you had your own darkroom, you knew enough to previsualize your photograph before snapping the picture. You'd use a light meter to determine the range of your scene and gauge the optimal exposure. In the darkroom you'd know how much to push or contract the roll's development time. In short, you knew how to get the desired look of a scene in a print before ever pressing the shutter button.

In most digital cameras, a whole list of dynamic scene adjustments go to work on a file. You probably know about the lossy compression artifacts incurred by saving in the JPEG format. You may not realize the camera also handles settings for color balance, sharpening, white balance, temperature, and other factors. Most of the models reviewed here give you some control over these factors, but the precision is loose at best. Yes, you can adjust these factors in a photo editor, but this requires time and skill.

The RAW file format side-steps the problem entirely. With RAW the camera applies essentially no processing. What you get is exactly what the camera sensor sees. RAW quality is also substantially higher because each color channel records in 16-bit; JPEG channels are only 8-bit. This is important because when you do things such as apply filters or change contrast, 8-bit colors tend to fragment and rasterize in border areas, and these artifacts become noticeable during enlargement. These problems don't happen when editing with 16-bit color channels, even though your video card can't display 16-bit color channels.

There are different RAW formats depending on the maker, and these makers typically include their own RAW decoder software. However, Adobe released its first Camera Raw plug-in for Photoshop 7 in February 2003, and the functionality is now built into Photoshop CS. Camera Raw isn't compatible with all RAW formats, so check Adobe's RAW support page.

RAW's downside is that you end up with substantially larger file sizes. On the Canon Rebel, for example, I saw files in the 7MB range that converted to about 36MB 16-bit TIFFs in Photoshop CS. The upside to RAW is far better ability to control tone and color before the file even reaches your editor. In Camera Raw you'll also find quick white balance profiles and the ability to correct lens vignetting (darkening at the edges of an image) and chromatic aberration (color flaring at bright edges). ▲

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Digilux 2
$1,850
Leica
www.leica-camera.com
CPU CPU CPU CPU

design. It's the best adaptation of traditional going digital I've seen in a camera, and it handles like a dream. That said, Panasonic's LC1 is the *exact* same camera (color scheme excepted) for hundreds less.

Nikon D70

You don't realize how chopped down the 6.1MP Digital Rebel feels until you pick up the D70. Heavier and textured for better gripping, Nikon's bundled AF-S DX 18-70mm lens features manual focus and telephoto rings with the perfect amount of tension, making Canon's lens feel flimsy in comparison. Nikon's menu system (25 custom functions) is a breeze to navigate, but the exterior controls require more study than Canon's. This wouldn't bother me if the D70's image quality vs. the Rebel's justified the increase in complexity and cost.

Yes, the D70 has superior customizability. Yes, the 18-to-70mm lens offers a needed telephoto boost. And nobody rivals Nikon for instant-on shooting or outrageously good continuous firing. Still, I spent a lot of time comparing the two cameras and finally had to concede that Canon performed better. There were too many times when Nikon didn't yield quite as much crispness and lost shadows in high-contrast scenes. Nikon's color was also sometimes a bit muted.

From construction to self-timer flexibility to exposure compensation to shutter speed, Nikon edges out the Rebel. But the D70 lacks that ISO 100 setting that yields such flawless outdoor images, thus sometimes requiring additional exposure compensation, and there were rare times when I picked up traces of purple fringing I didn't see with Canon. I would use the D70 over the Rebel for action shooting, but for a general-use DSLR, the Rebel still wins.

D70
$1,199
Nikon
www.nikonusa.com
CPU CPU CPU CPU

Olympus C-7070 Wide Zoom

The least savory part of the C-7070 is its appearance and heft. Olympus C-series cameras tend to be smaller and more stylish. This unit is more like a slab of ore. Still, if having a very good feature and a 7MP sensor means having a slab of a camera, so be it.

My favorite feature is the dual-swivel LCD. One hinge swings the screen arm up 180 degrees while another twists the screen 270 degrees, making it easy to shoot over a crowd or from the ground. I like the center magnification area for manual zoom in a mid-level camera, but not as much as Olympus' Predictive AF mode, which uses the autofocus sensor to track an approaching subject and predict its distance when the shutter snaps. You can pick from any of 143 target AF zones within the field of view. You'll even find underwater shooting modes for use with the optional PT-027 underwater housing.

Olympus menus are normally quite intuitive, but the C-7070's was somewhat hit and miss. The optical viewfinder image is woefully small, but you can reroute the top-mounted LCD display data to the main LCD. Another plus is support for xD and CF cards (including Microdrives up to 4GB). External controls are fairly self-explanatory once you find them all. You don't get depth-of-field preview, but there's a histogram buried two clicks under the review image.

For a $500 street price, the C-7070 serves up decent image quality. Flash performance is good, and detail sensitivity in daylight is great, although I noticed some occasional gray regions that looked like they'd been smeared by the otherwise highly effective integrated noise filtering. Like Fujifilm, Olympus features a one-inch super macro mode, although macro exposures were more erratic. The C-7070 also had strong color reproduction. If you don't need an SLR, this model makes a great half-way point between Casio and Sony.

C-7070 Wide Zoom
$599.99
Olympus
www.olympusamerica.com
CPU CPU CPU C

Panasonic Lumix DMC-FZ20K

Given their identical price points, one can't help but compare the Lumix against Olympus. If you need optical zoom, there's no question. The FZ20K's 12X is equivalent to a 36-to-432mm zoom in 35mm film, and Panasonic includes a screw-on lens shade to prevent flare and ghosting under bright light. The Lumix also has a real-time histogram (which changes from white to yellow in the event of excessive clipping) and center-area magnification for manual focusing. Panasonic has a more comfortable body shape and a more condensed and intuitive control layout,

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Lumix DMC-FZ20K
$599.99
Panasonic
www.panasonic.com
CPU CPU CPU C

although this comes at the expense of some secondary features you might never miss. This Lumix doesn't shoot RAW files or offer a swiveling LCD, though, much less any kind of secondary LCD.

You'll need the histogram, as the Lumix tended to run destructively dark. (This is why I'll forgive the use of an EVF because you need to see the graph clearly, even under bright light.) With flash scenes Panasonic's clarity and color were better than our SLR contenders, though still noisier than the Leica. In outdoor shooting the FZ20K's results were good but not great. Best results were shot outside of auto modes. The mode dial also has two shortcut positions for the scene profile of your choice, saving you trips into the menus.

Panasonic's Quick Review button beats having to drop into Playback mode. The unit's autofocus mechanism is quite slow, but the macro mode gets you very tight focal range within two inches. Panasonic builds in optical image stabilization, and this feature enabled less motion blur when shooting unsupported and without a flash indoors. Beyond about 3X zoom (the LCD shows you the amount of zoom you're at), minor blurring was unavoidable.

Ultimately, it's a toss up between Panasonic and Olympus. The benefits and detriments balance out, leaving you to decide which one is a better fit for your needs.

Pentax *ist DS

At 4.9 inches high x 3.6 inches wide x 2.6 inches deep, the Pentax is so small you don't believe it's an SLR. The 6.1MP *ist DS, however, is an intelligently planned, comfortable camera suitable for all skill levels. Controls are well-placed, and Pentax nails the tension in the lens focus and telephoto rings. The optical viewfinder is film-SLR caliber (large, bright, and rubberized), but there's no camera assistance for when you're focusing manually. The two-inch LCD is easy to read in full daylight, and the autofocus is fast if not quite Nikon-level. Also important is that the *ist DS is compatible with a slew of Pentax lenses, including older film lenses, although this may restrict some functionality.

Knowing where user priorities lie, Pentax opts not to cram a tiny postage stamp in with the rest of the image data when you hit the Info button in playback mode (accessible with a button press, not via a mode dial). Instead, the first Info press reveals a brightness histogram spanning most of the display, which you can set to display over the instant review after taking a picture. A second press of the button shows other information.

Most outdoor shots looked great, provided I used the 16-segment metering system rather than spot- or center-weighting and I shot subjects more than four or five feet away. If not, images were too dark and needed exposure compensation. That said, Pentax showed far less image noise and correction smudging than many cameras. Similarly, indoor flash use and candlelight shooting at default settings were consistently clear but too dim and needed boosting.

With RAW support, 18 custom settings, and a handy mode dial (with no-flash and bulb modes), Pentax packs a lot of capability into a simple, solid design. If you're willing to learn how to get proper low-light exposures, this is an excellent alternative to the Rebel.

***ist DS**
$899.95
Pentax
www.pentaximaging.com
CPU CPU CPU CPU

Sony DSC-F828

The F828 is dripping in coolness. Its telephoto lens (28-to-200mm 35mm equivalent) looks hot and swivels for overhead and ground-level shooting. Feature placement is impeccable; the menus are simple and intuitive; and an on-screen animated wheel in conjunction with the settings control is akin to the iPod's scroll wheel.

Sony's chief problem is that whereas many vendors pack 5MP or 6MP into a 2/3-inch CCD sensor, it packed 8MP. This means each pixel's size is very small, which invariably leads to problems with having enough light strike each photodiode, as well as cell-to-cell noise issues. Noise is everywhere in the F828's output, and I wonder if the problem might be compounded by Sony using sharpening. The F828's images are the most detailed and clear of any camera I saw, save the Leica, but graininess is present even at the lowest ISO settings. Unless you zoom in, though, the grain is often unnoticed, and you can minimize it through post-processing. Moreover, Sony's low-light sensitivity was very good, and you expect grain in such conditions.

Kudos to Sony for finally supporting CF cards alongside Memory Stick, as well as

DSC-F828
$899.95
Sony
www.sonystyle.com
CPU CPU CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Would-Be Camera Advances

In July 2002's "Under Development" (page 106), we spotlighted Foveon's X3 technology, which abandons CCD and CMOS sensors (and the filtering systems that can impair their quality) in place of special silicon. The silicon senses light levels at different depths under its surface, and a grid of subsurface sensors conveys each detected color as a pixel. Foveon maintained that its technology delivered superior images, but to date only Sigma's pro-class SD9 and SD10 models have adopted the X3 sensor. In February 2004 Foveon announced a Polaroid x530 point-and-shoot would incorporate a 4.5MP X3 sensor, but the camera still doesn't exist in the retail market.

Reviewers liked the X3 chip's output, but Foveon ultimately was confronted with two problems. First, as CCD sensors quickly evolved over the past two years, professional-level CCDs could generate subjectively similar or better images at higher resolutions than Foveon's "10.2MP" sensor for less money. (In reality, the latest X3 chip captures 3.4MP per color channel. Foveon claims that this multiplies out to 10.2MP. Others maintain that three color dots make one pixel, meaning the SD10 is a 3.4MP camera for $1,800. That said, larger pixels are inherently superior in image quality to smaller ones, so higher resolution with smaller pixels may actually provide worse overall quality depending on the overall design.) Second, Sigma opted to make its SD cameras use proprietary lens mountings, so the Nikon and Canon mounts that pervade the market wouldn't work with Sigma's models.

The other notable development in lenses and sensors is the Four Thirds System (www.four-thirds.org), which is an attempt by Olympus, Kodak, and others to create a standard for digital cameras based on a 4/3-type image sensor (which could be CCD, CMOS, or some other technology) and lens mounting design. The argument for Four Thirds is that, particularly in wide-angle shots, the outer regions of an image are susceptible to hitting the sensor's pixel wells at an angle, not straight-on like in the center of the image. At an angle the light may strike the pixel well's wall, not the photodiodes at the well's bottom, and this can result in dimming and color degradation. The system mandates that optics be able to pass a wide enough zone on the camera back so that the sensor area is covered with straight-on light rays and slanted light falls outside the area.

The 4/3-type sensor design and a standardized lens system have yet to translate into cost savings. Larger sensors can yield superior images, and while large chips may be much more money now, falling prices will narrow the gap considerably. Similarly, as technology evolves, the Four Thirds standard doesn't provide for advances in sensor or lens technologies that might benefit from size changes. Also, Canon and Nikon aren't Four Thirds supporters and would anger users if they suddenly hopped on the smaller bandwagon. ▲

RAW support (proprietarily encrypted but supported by Adobe Camera raw) and a live histogram. You can shoot audio-enabled videos at 30fps and 640 x 480, plus Sony brings over short-distance infrared night shooting from its camcorder line.

Sony's flash performance, white balancing, and outdoor color breadth are excellent, and the custom settings are comprehensive. As a single-shot non-SLR, you'll find few better models. For fast shooting Sony boots quickly but suffers from slow memory writes. This gave me the second-slowest shot-to-shot time at 3MP JPEG settings. Shooting RAW files can lock the camera for more than 10 seconds. If you don't mind the noise, the F828 is a stunner. ▲

by William Van Winkle

To read our "Histograms Unleashed" and "The View On Viewfinders" sidebars, subscribers can go to www.cpumag.com/cpujun05/digicams.

A Digital Camera Comparison

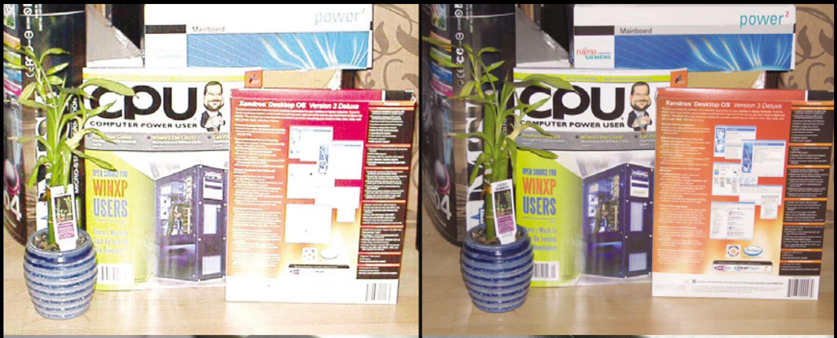
For the most part, the features these digital cameras offer are beyond the scope of a newbie, but if you want to get serious about your photo-taking, you don't want an entry-level model anyway. Here's a comparison of what the cameras in this roundup can offer and are capable of.

Manufacturer	Model	Price	Effective Pixels	SLR?	Optical Zoom	ISO Range	Storage	Formats	Burst Mode	Power On To First Shot (seconds)
Bushnell	Outdoor Camera	$299.95	2,048 x 1,536	No	N/A	100-400	SD	JPEG	NA	10.98
Canon	EOS Digital Rebel	$799	3,088 x 2,056	Yes	N/A	100-1600	CF	JPEG, RAW	2.5fps/4 shots	3.09
Casio	QV-R62	$299.99	2,816 x 2,112	No	3X	64-500	SD	JPEG, AVI	3fps/3 shots	4.43
Fujifilm	FinePix S20Pro	$799	2,382 x 2,128	No	6X	200-1600	CF, xD	JPEG, AVI, RAW	4.5fps/10 shots	4.78
HP	Photosmart R717	$299.99	2,934 x 2,170	No	3X	50-400	SD	JPEG, MPEG-1	3 shots less than 1 second.	3.94
Leica	Digilux 2	$1,850	2,560 x 1,920	No	28-to-90mm equiv.	100-400	SD	JPEG, RAW, M-JPEG	Up to 2.7 per second	3.86
Nikon	D70	$1,199	3,008 x 2,000	Yes	N/A	200-1600	CF	JPEG, RAW	3fps/12 shots	1.08
Olympus	C-7070 Wide Zoom	$599.99	3,072 x 2,304	No	4X	80-400	CF, xD	JPEG, RAW, TIFF	3.3fps/4 shots (RAW)	7.28
Panasonic	Lumix DMC-FZ20K	$599.99	2,560 x 1,920	No	12X	80-400	SD	JPEG, TIFF, M-JPEG	2-3fps/4 shots (fine)	6.13
Pentax	*ist DS	$899.95	3,000 x 2,008	Yes	N/A	200-3200	SD	JPEG, RAW	2.8fps/8 shots	1.58
Sony	DSC-F828	$899.95	3,360 x 2,460	No	7X	64-800	CF, Memory Stick Pro	JPEG, RAW, TIFF	2.6fps/7 shots	3.78

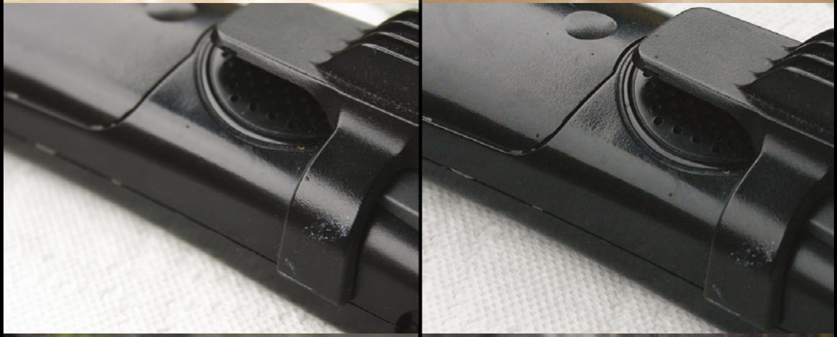
CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

A Shot-To-Shot Comparison

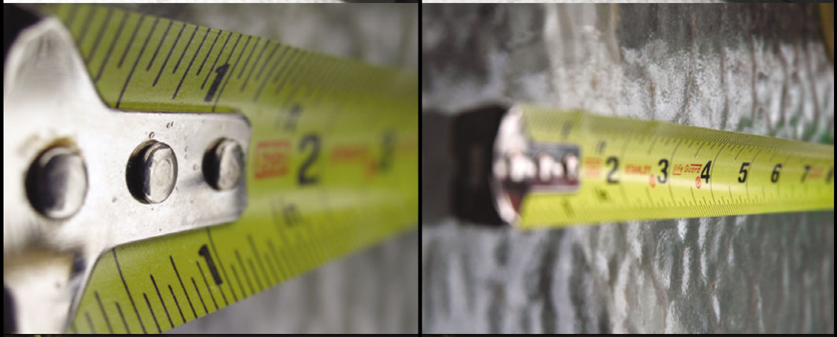
To detail how different cameras handle different functions, we took various shots under various conditions and matched them up to give you a visual idea. Below are a few examples of how one camera handles a given shot differently than another. Keep this in mind when it's time to make a buying decision.



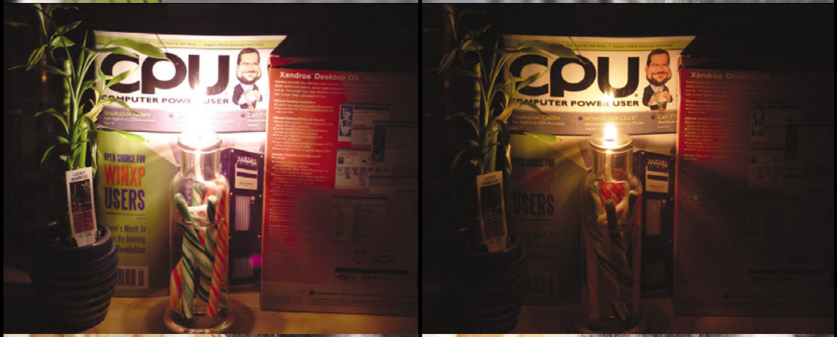
Bushnell vs. HP flash: The Bushnell and HP cameras (both $299) represented the low-end of our roundup. However, onboard electronics make all the difference in automatically adjusting flash intensity and sensitivity. The Bushnell image (left) is brutally washed out while the HP, while a tad dark and needing more contrast, is much clearer, better exposed, and lower in noise.



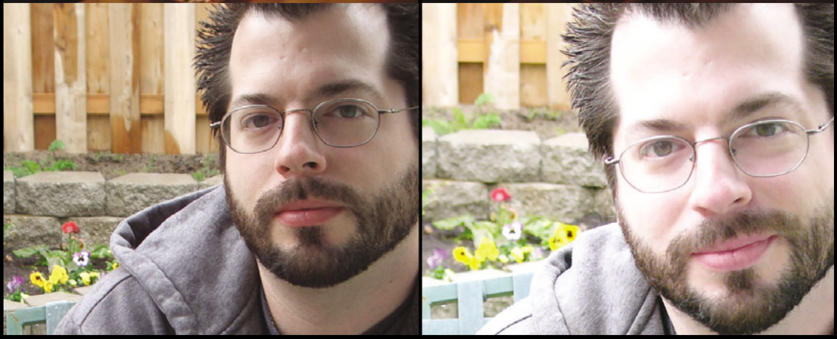
I found the gray area where the phone meets the paper towel was a strong tell-tale of how each camera handled noise. If you look closely, you can see the Leica (right) has a bit of graininess that would be undetectable in a regular-sized print. The Canon displays no such noise because the camera's noise reduction smoothes it away, along with some detail. Both images were shot as JPEGs, but Leica's ability to capture fine detail in whites and shadows is phenomenal.



Surprisingly, for strong macro performance, a midlevel camera may be your best bet. The Olympus (left) exemplifies this. I had the lens barrel resting against the end of the tape measure here. In contrast, I had to back up nearly one foot to get the Nikon's macro focus centered on the 4-inch mark. Naturally, SLRs have the advantage of swappable lenses, so you could buy a superior lens dedicated specifically to macro work, but the cost between the two approaches is considerable.



This scene was one of the hardest tests of each camera's auto abilities. In an effort to define a white boundary for the scene, the Fujifilm S20Pro (left) turned our candle into a blazing white torch. This yielded the best detail of any camera of the lamp's candy sticks and the nearby text, but the mood was lost. Sony (right) had the best overall representation, preserving the soft glow while offering good detail, clarity, and illumination reach. Some cameras only shown the nearest leaves and no text.



This outdoor portrait shows the necessity of mastering manual exposures. Under nearly identical light conditions, the nearly low-end Casio (left) does a better job of multimetering the scene in Program mode than Leica (right). I ignored the right-edge bunching in Leica's histogram to make the point, but this also illustrates the beauty and advantage of a live histogram. A quick glance and a couple exposure compensation clicks would have let the Digilux 2 deliver its stunning results, not this blanched flop.

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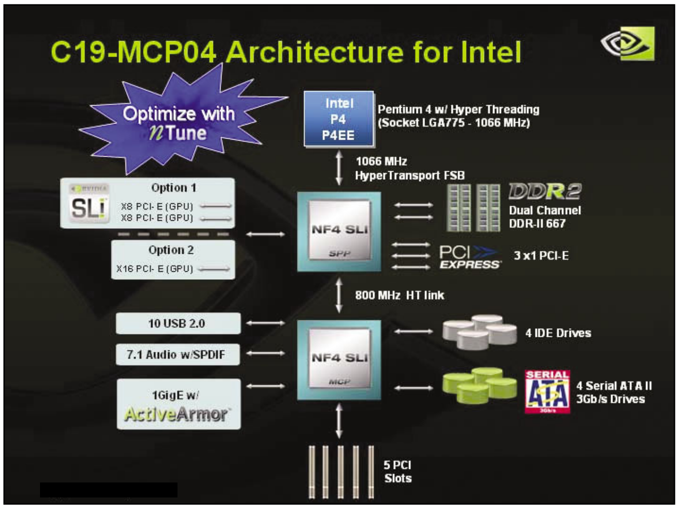
NVIDIA nForce4 SLI Intel Edition Chipset

It's been a long time coming, but once NVIDIA finally ponied up for the P4 Bus license, it was only a matter of time before I saw an Intel nForce chipset. Indeed, the nForce4 SLI Intel Edition will soon be an alternative and competitor to Intel's 925XE chipset.

Largely carried over from the AMD platform (save for one major necessary change), the Intel version of the nForce4 still packs the same punch with a 1,066MHz FSB, a plethora of features, and, of course, that nifty SLI capability for 3D graphics lovers.

Features aside, NVIDIA had a lot of work to do to carry the nForce over to an Intel platform. AMD's Athlon 64 processor sports its own memory controller, but the Pentium 4 doesn't. Instead of being a single-chip solution, the Intel version of the nForce4 sports a two-chip northbridge and southbridge, or as NVIDIA calls it, the SPP (System Platform Processor) and MCP (Media and Communications Processor).



[redacted]

The SPP is all new and manufactured on a 0.13-micron process along with 61 million transistors. The memory controller itself only supports 128-bit wide DDR2 up to 667MHz (peak 10.6GBps sent in parallel) but is dual-channel capable. A lot of P4 systems end up running at a different FSB rates for the CPU and the system memory, but NVIDIA's QuickSync feature allows the controller to enable low-latency memory access under such circumstances. Another nifty feature carried over is the DASP (Dynamic Adaptive Speculative Preprocessor). Version 3.0 of this feature comes with more advanced prefetch algorithms, giving the CPU more priority in tight-memory-bandwidth situations by speculatively pulling data into a buffer on the memory controller. Even so, the P4 already comes with a large chunk of L2 cache and prefetching capabilities. Despite this, NVIDIA claims a performance boost of 2 to 4% when using DASP 3.0.

The SPP also dishes out up to 20 lanes of PCI Express connectivity. Graphics get 16 lanes, two of which you can configure for the swanky SLI solution; otherwise, you can use a single graphics card in a PCI-E X16 mode.

The 0.15-micron MCP (with 21 million transistors) takes care of the less strenuous I/O functions. Connecting storage media is seamless with NVIDIA's latest NVRAID technology (now called MediaShield). Hard drives are less expensive than they used to be, and with users able to afford more

[redacted]

Specs: SLI and RAID 5 capable, dual-chip 0.13-micron SPP, and 0.15-micron MCP solution

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

of them in various RAID arrays, NVIDIA wants to stay on top in this area. NVIDIA has thus added RAID 5 support to allow for drives with 240GB capacity with striping and redundancy from three 120GB drives. Along with bootable RAID 5 arrays, users can choose/use RAID 0, RAID 1, RAID 0+1, JBOD, Cross Controller RAID, and spare disk allocation arrays. The drivers provide guidelines/wizards to help you through; and, if the drive fails, you get a graphical representation of it. Also, NVIDIA's MCP supports SATA II (300MBps) transfers and NCQ.

Storing your data is one thing, but doing so whilst keeping it safe is another, and in this area NVIDIA has made strides with its firewall offerings. The latest version, ActiveArmor, is integrated into hardware and able to do packet inspection of full-line-rate network traffic at full-duplex Gigabit Ethernet speeds. The software is user friendly, and the advanced folks can manage it via remote access. Furthermore, a HyperTransport link with a 1.6GBps bit rate links the SPP and MCP, which provides ample bandwidth, at least on an Intel platform (Intel uses 2GBps on its 925).

For a first run on an Intel platform, things bode well performance-wise, and the nForce4 SLI stacks up well against a similarly equipped Intel 925XE. The nForce 4 SLI is slightly slower in some cases, but turn it up at a 1,066MHz FSB and the situation changes. Then again, with newer driver releases, things could change some more. Throw in the ability to run a couple of NVIDIA 3D cards in SLI mode, and the whole package becomes more appealing. However, you could argue that throwing another grand at a lost cause isn't really the thing to do if you're a die-hard gamer. The fact remains that the Athlon 64-based system is the way to go for the best 3D-gaming performance. Gaming aside, NVIDIA will still have its work cut out for it when getting into the mainstream with different (aka NON-SLI) flavors of its nForce4 for Intel CPUs. This market has long been dominated by Intel, and the company's not going to give it up easily; however, MSI, ASUS, and GIGABYTE should be announcing products shortly. ▲

Benchmark Numbers

Futuremark PC Mark04 - CPU Module	
Nforce 4 SLI Intel Edition	5780
Intel i925XE	5791
Nforce 4 SLI with Athlon 64	4624
Futuremark PC Mark04 - Memory Module	
Nforce 4 SLI Intel Edition	6831
Intel i925XE	6103
Nforce 4 SLI with Athlon 64	5742
Windows Media Encoder 9 - MPEG to WMV conversion	
(lower is better)	
Nforce 4 SLI Intel Edition	280 seconds
Intel i925XE	285 seconds
Nforce 4 SLI with Athlon 64	327 seconds
Cinebench 2003 - Cinema 4D benchmark	
(lower is better)	
Nforce 4 SLI Intel Edition	65
Intel i925XE	65
Nforce 4 SLI with Athlon 64	can't run multithreaded
Doom 3 - Performance	
Nforce 4 SLI Intel Edition	148
Intel i925XE	144
Nforce 4 SLI with Athlon 64	156
Doom 3 - SLI Performance at 1,600 x 1,200 x 32	
Nforce 4 SLI Intel Edition	57
Nforce 4 SLI Intel Edition SLI Mode	105
Nforce 4 SLI with Athlon 64	111
Far Cry - SLI Performance at 1,600 x 1,200 x 32	
Nforce 4 SLI Intel Edition	49
Nforce 4 SLI Intel Edition SLI Mode	31
Nforce 4 SLI with Athlon 64	54

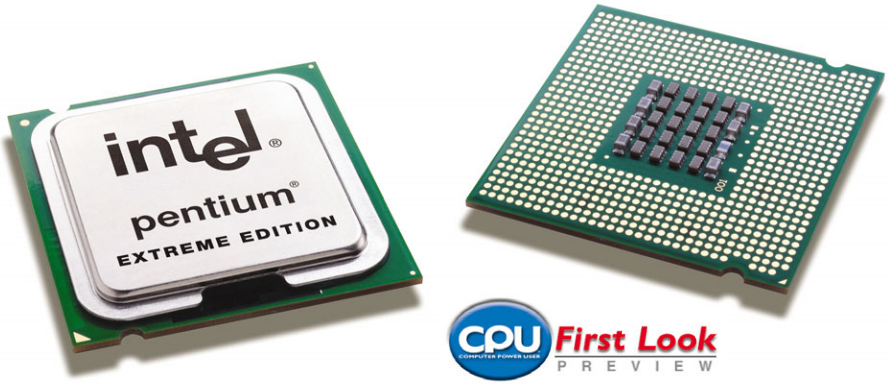
by Alex "Sharky" Ross

nForce4 SLI Intel Edition Chipset
$200 (approx. mobo price)
NVIDIA
www.nvidia.com

CPU CPU CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Intel Pentium Extreme Edition 840: Dual Core



There's been a lot of early buzz and rumors surrounding Intel's dual-core technology this year, and for the first time in memory, Intel shipped a few early preview systems to me to toy with before the actual release. The official release along with pricing information wasn't available at press time, but I do know the processor's name is Pentium Extreme Edition.

The Pentium Extreme Edition 840 processor, clocked at 3.2GHz, is basically two 90nm Prescott 1MB dies with their 230 million transistors joined at the hip. Not only do you get the benefits of two 1MB L2 caches, you get the same advanced power management available on the Pentium 600 (including dynamic voltage identification), processor halt during idle, and an on-die thermal monitor that dynamically adjusts the clock speed and voltage. Also, the package is physically larger and generates double the amount of heat when compared to a single core. The operating voltage is between 1.2V and 1.4V and sports a thermal power design of 130W. Despite this, the provided HSF combo doesn't seem that different, and you don't need any fancy watercooling just yet.

The FSB is set to 800MHz. (I would have preferred 1,066MHz.) The 840 will feature support for Intel's EM64T 64-bit technology, but only the 840 Extreme Editions will have Hyper-Threading.

My test system included the Intel 955X chipset and a D955XBKLKR, code-named Black Creek, which hasn't been released. The 955X sports a dual-channel DDR2 667MHz memory controller (up to 8GB of ECC memory), support for RAID 5, and, in the future, the two x16 PCI Express slots will work for SLI-capable graphics cards. The 667MHz memory was set to 4-4-4-12 timings in the BIOS. Nonetheless, I was sorry to see things run asynchronously at this stage and would've preferred a 1,066MHz FSB as on previous Extreme Editions for lower latency DDR2 RAM.

As with all new technology, it's going to be a good while before we see real, tangible benefits for most users that intend on going for dual-core Intel processors. Also, there aren't a lot of benchmarks right now that show off just what one of these CPUs can do. There's not only a lack of multithreaded applications to test, but most of what I do on these high-end systems is single-threaded, so office suites, Web browsing, media players, and especially gaming will all perform in the same manner as a single-core CPU clocked at the same speed. However, this will change soon.

You can start to see benefits, however, when diving deeper into video encoding and editing, as well as 3D rendering. Where things get interesting is under multitasking situations. For example, previously on a single-core Pentium, I wouldn't recommend playing Doom 3 whilst encoding video because your gaming would suffer tremendously. Not so with dual core. There were a few tests I did for sanity's sake (or was it insanity?) where I set up some unlikely scenarios running multiple applications at the same time and found that performance was much improved with dual core. In a simpler scenario, I ran a Norton Antivirus scan whilst fragging away, which I did without hampering performance much.

These are somewhat tangible benefits, but it'll be up to you to decide on how much multitasking you intend on doing and if indeed your usage is more in line with that of the traditional workstation before forking out for a system. It should be said, however, that the price differential between single-core and dual-core Pentiums will apparently be very marginal, making it somewhat of a no-brainer in that sense. ▲

by Alex "Sharky" Ross

The First Look Numbers

Cinebench 2003 - Cinema 4D benchmark (lower is better)

Pentium Extreme Edition 840	43.1
Pentium 4 570J 3.8GHz	66.4
Athlon 64 4000+	77.2

Futuremark PCMark04 - CPU Module

Pentium Extreme Edition 840	6082
Pentium 4 570J 3.8GHz	5874
Athlon 64 4000+	4613

Futuremark PCMark04 - Overall

Pentium Extreme Edition 840	5902
Pentium 4 570J 3.8GHz	6029
Athlon 64 4000+	5033

Windows Media Econder 9 - MPEG to WMV conversion (lower is better)

Pentium Extreme Edition 840	253 seconds
Pentium 4 570J 3.8GHz	288 seconds
Athlon 64 4000+	340 seconds

Doom 3 - Performance

Pentium Extreme Edition 840	83fps
Pentium 4 570J 3.8GHz	88fps
Athlon 64 4000+	98fps

Seagate, LaCie & Maxtor: The Coolest Hard Drives To Go

USB flash keys are fine for replacing floppy diskettes, but let's face it: You're never going to use a thumb drive to move your Half-Life 2 config, music collection, or ripped DVDs. There's no shortage of spacious portable hard drives to tackle such jobs, but we just found three of the coolest.

USB 2.0 Pocket Hard Drive (5GB)

A pioneer in Lilliputian disk storage, the 5GB Pocket Hard Drive dispenses with the absurdity of bring-along cabling for such a tiny device by making the USB plug and its short cable retractable. A blue LED that shows connection and drive activity gives the drive some bling. Seagate also adds rubber grips on the bottom and uses extra shock protection.

USB 2.0 Pocket Hard Drive (5GB)
$159.95
Seagate
www.seagate.com

A bundled Toolkit application lets you establish sizes for a secure and a public area within the drive. You can only access the secured zone by typing in a password from within Toolkit.

The reason to buy this unit is the integrated cable. There are higher capacity 1.8-inch USB drives at the same price point, but then you're stuck with an extra cable and a less pocket-friendly feel.

silverscreen (40GB)

Some brilliant soul at LaCie put two and two together: Hey, if a bunch of people use portable hard drives for transporting movie files, why not make the drive itself capable of being a movie player?

silverscreen (40GB)
$249
LaCie
www.lacie.com

The silverscreen's $249 price is a bit extreme (the 80GB for $299 is more reasonable), but consider that this device measures 3.5 x 5.5 x 1.1 inches (HxWxD) and weighs about 10 ounces, has a rugged but sweet silver and clear enclosure, and includes an IR remote control. The back panel offers USB 2.0, SPDIF, and HDMI output jacks. Adapters then step in to provide RCA audio, composite, and S-Video.

LaCie saves a few bucks by passing through Dolby Digital and DTS streams, rather than decoding them, and if you want adapters for optical SPDIF or DVI, you'll need to do some more shopping.

Still, the silverscreen does brilliant work displaying MPEG-1, MPEG-2 (AVI, ISO, VOB), MPEG-4 (AVI, DivX, XviD), and videos look bright and sharp. LaCie also covers resolutions up to 1,920 x 1,080i or 1,280 x 720p for next-gen HDTV displays.

Shared Storage Drive (200GB)

Essentially, the Shared Storage Drive is a Maxtor OneTouch II with a 10/100 LAN jack, two USB ports, and an integrated Linux OS. Plug into your switch/router, install the desktop software, and go. Then grab a couple of external flash or hard drives, plug them in the USB ports, and they'll pop up as folders under the SSD drive. With a pair of 400GB drives in cheap USB enclosures, you could be running a 1TB NAS for under $1,000. Alternatively, plug in your USB printer and the SSD works as a LAN print server.

Shared Storage Drive (200GB)
$299.95
Maxtor
www.maxtor.com

NAS frees you from needing to keep a host PC running 24/7 to serve up your documents, media files, and other data. NAS is also harder to hack from the outside. The two places Maxtor slipped was not enabling the SSD to act as an FTP server and going with 10/100 instead of Gigabit Ethernet.

Maxtor's bundled desktop software turns the SSD into a typical drive under My Computer, and the Drag And Sort function can sort copied files into folders, such as My Music and My Software, according to their file type. Overall, a great, affordable way to bring the benefits of NAS into the home. ▲

by William Van Winkle

Portable Hard Drives At A Glance

Vendor	Model	Capacity	Rotation Speed	Interface	2GB transfer Write time (minutes:seconds)
LaCie	silverscreen	40GB	4,200	USB 2.0	1:43
Maxtor	Shared Storage Drive	200GB	7,200	10/100 Ethernet	8:38
Seagate	Pocket Hard Drive	5GB	3,600	USB 2.0	10:36

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Corsair 5400UL & Kingston KHX6000D2K2 Showdown

TWIN2X1024A-5400UL
$310
Corsair Memory
(510) 657-8747
www.corsairmemory.com

KHX6000D2K2
$500
Kingston Technology
(877) 546-4786
www.kingston.com

With dual-core processors almost available, memory performance will become more important.

Intel's reference kit includes DDR2-667 modules with 5-5-5-15 timings. But, Corsair and Kingston announced high-performance modules that run even faster and at more aggressive latency settings.

The Kingston memory runs at PC2-6000, or DDR2-750 at 4-4-4-12 timings. Those aren't great compared to DDR-400 at 2-2-2, but these modules are almost twice as fast. You'll also notice that 750MHz is higher than the 955X's top bus speed. These modules will favor overclocking, which will be more interesting now that Intel has unlocked the Extreme Edition's bus multiplier.

Corsair's modules don't have the bus speed flexibility, but they're snappier in the latency department (3-2-2-8 timings at 675MHz and 2.1V). Though not tweaked for overclocking, running at the chipset's stock 667MHz is fast thanks to those specs.

Both sets of memory modules show better performance characteristics than the Micron sticks at CAS 5. A Windows Media Encoding job that takes 4:54 (minutes:seconds) with Micron modules takes 4:44 with the KHX6000D2K2 kit and 4:40 using the Corsair kit. PCMark04 and SiSandra 2005 both demonstrate ascending performance, as well from the Micron to Kingston to Corsair pieces.

At default speeds the TwinX 5400UL kit posts the best numbers and price point. Kingston's HyperX kit is competitive but more expensive. However, if you're shooting for new overclocking records, Kingston's KHX6000D2K2 is the way to fly. ▲

TWIN2X1024A-5400UL Specs: 675MHz rated for 3-2-2-8 at 2.1V, SPD programmed at 4-4-4-12 values, lifetime warranty, and matched 512MB modules

KHX6000D2K2 Specs: 750MHz rated for 4-4-4-12 at 1.9V, SPD programmed at 4-4-4-12 at 1.8V values, lifetime warranty, and matched 512MB modules

by Chris Angelini

ASUS S-presso P-111

P-111 Small-Form-Factor Chassis
$315
ASUS
(510) 739-3777
www.asus.com

Media-center systems depend less on the latest hardware and more on ease of use, simple setup, and sharp looks. Although ASUS' S-presso P-111 verges on outdated with its Intel 865G chipset, ICH5 controller, and Socket 478 processor interface, it puts its best face forward, replete with features.

The system's exterior is covered in plastic and sports a svelte front cover, darkened and nearly flat. Three plastic covers hide the front-mount card reader, a pair of USB 2.0 ports, audio jacks, and the 5.25-inch optical bay. Even powered on the front fascia retains its classy look, highlighted by several touch-sensitive buttons that control various functions of media playback.

Setting the system up is easier than other SFF systems, too, thanks to a mechanism for opening the chassis and exposing its innards. The relevant cables come preconnected—just drop in a processor, attach ASUS' proprietary cooling solution, add memory, drives, and peripherals.

The system isn't perfect, though. To begin, it's set up by default to operate from the integrated Extreme Graphics 2 core, substandard even for media center enthusiasts. The onboard AGP 8X slot accepts a single-card solution, and you'd be best off with a card such as BFG's GeForce 6600 GT OC that boasts dual-DVI output and a component connector. ASUS includes a Leadtek LR6613 TV/FM tuner card, which serves the system's needs but does not appear on Microsoft's logo list for Windows XP Media Center 2005. Instead, you'll wind up with the bundled InterVideo application package. Finally, the 220W power supply is definitely underpowered given the requirements of a 3.4GHz Prescott core and an X800 or GeForce 6800 GT graphics card.

Though visually appealing and well equipped with media center features, the ASUS S-presso P-111 is outgunned by competing models that come in at a lower price. ▲

Specs: Intel 865G chipset, ICH5, Socket 478, 1 AGP 8X, 1 PCI (populated by TV card), 2 SATA, 7-in-1 card reader, 220W power supply, touch-sensitive LCD panel, bundled remote

by Chris Angelini

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

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Anand's Corner

by Anand Lal Shimpi

Dual-Core Desktops

Dual-core has been the talk of the town for quite a while, and now that everything's public I can be more specific about a few things. First off, AMD's dual-core CPUs are the Athlon 64 X2 for the desktop and the Opteron xx5 for the server/workstation markets. The official launch of the desktop Athlon 64 X2 will be in June, with availability very late this year (think late Q3 to late Q4).

Intel's dual-core CPUs are the Pentium D and the Pentium Extreme Edition. Ranging from 2.8GHz up to 3.2GHz, the only thing the Extreme Edition brings to the table is Hyper-Threading, meaning that its two cores appear to the OS' scheduler as four logical processors whereas the Pentium D's two cores only appear as two processors.

AMD has generally been the more affordable chip maker, but that does not apply to dual core. Each dual-core chip eats up wafers twice as quickly as their single core counterparts, and frankly, Intel can afford to make more than AMD can. Thus you see a difference in approaches between AMD and Intel: AMD opted to focus on the low volume server/workstation markets for their first dual-core chips, while Intel focused on the high volume desktop market for dual core. I'll discuss impacts in a moment, but first let's look at the impact of these differing strategies on prices:

AMD		Intel	
Athlon 64 X2 4800+ (2.4GHz/1MBx2)	$899	Intel Pentium EE 840 (3.2GHz)	$1000
Athlon 64 X2 4600+ (2.4GHz/512KBx2)	$799		
Athlon 64 X2 4400+ (2.2GHz/1MBx2)	$N/A		
Athlon 64 X2 4200+ (2.2GHz/512KBx2)	$N/A		
Athlon 64 4000+ (2.4GHz/1MB)	~$550	Intel Pentium D 840 (3.2GHz)	$530
Athlon 64 3800+ (2.4GHz/512KB)	~$360	Intel Pentium D 830 (3.0GHz)	$316
Athlon 64 3500+ (2.2GHz/512KB)	~$260	Intel Pentium D 820 (2.8GHz)	$241

AMD's dual-core desktop CPUs start where the fastest single-core CPUs left off, meaning that you can expect to pay around $600 for the lowest-end Athlon 64 X2. However, Intel's strategy places the cheapest dual-core CPUs at $241, and the most expensive Pentium D at $530. With the exception of the Extreme Edition, you can get the fastest dual-core desktop CPU from Intel for less money than the slowest dual-core AMD CPU.

The impacts of the differing strategies are numerous:

1 AMD will enjoy a huge performance advantage in the server and workstation spaces; dual-core Xeons won't begin shipping until the end of this year, meaning that for the cost of a two-way Xeon, you could have a four-way Opteron . . . and depending on your load, nearly two times the performance.

2 Intel's low priced dual-core CPUs should mean that over the next 18 months there will be a significant installed base of dual-core systems, meaning that developers should have no reason not to multithread their applications. By late 2006 most new applications should be multicore aware (including games). You can thank Intel's pricing for that.

3 Choosing which CPU to use on your desktop is much more difficult now. If you have an unlimited budget, AMD's high-end Athlon 64 X2 4800+ will be the fastest thing money can buy. But if you find yourself with less than a $500 CPU budget, then things get much more complicated. Do you purchase a very fast single-core Athlon 64 or a slower, but dual-core, Pentium D? My personal recommendation is in favor of dual core at whatever price point you can afford, but that's because I tend to be a heavy multitasker. From the benchmarks I've done for AnandTech, the performance improvements when multitasking more than make up for any reduction in single application performance. But the final recommendation is very dependent upon your own usage patterns.

Hopefully, by the end of next year things won't be as complex. Both AMD and Intel are planning on replacing the vast majority of their CPU lines with dual-core parts, and for AMD that means much more affordable dual core in the future. Unfortunately it seems that for now, if you want dual core for less than $500, your only option will be Intel. It's not a bad option, but I tend to appreciate more choices than one. ▲

Talk back to Anand@cpumag.com

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, CBS' 48 Hours and Fortune. His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.

AMD has generally been the more affordable chip maker, but that does not apply to dual-core

The Shark Tank

ATI All-In-Wonder X800 XT: Better Late Than Never

by Alex “Sharky” Ross

Just over six months ago, ATI announced the X800 XT All-In-Wonder, which was supposed to add a plethora of improvements to the lineage all wrapped in its newest GPU. However, with such a delay (ATI has been guilty of this a few times in the past year), in large part due to supply issues, it sort of slipped by the wayside. The board did recently get dropped off on my doorstep and a good thing it was, too.

At first glance it looks very similar to an X800 XT; the single-slot HSF solution DVI/DB15 outs are the same as is the 256MB of GDDR3 RAM. The DVI-out is great for those of you with LCDs, as in the past there was never room for that output on older AIW products. The clock speeds are also set at 500MHz (effectively 1GHz) for memory and 500MHz for the eCore (16-pipe R420). Taking a closer look, you begin to notice a purple and gold color scheme and not the usual red PCBs we’ve seen in the past. The HSF combo on the GPU and RAM are actually gold-color plated to add some more bling. Also different from the outgoing AIW 9800 XT is the new Micro-Tune MT2050 RF tuner. The MicroTune replaces the traditional Philips tuner, which was more power hungry and larger in terms of surface area. The only drawback of this newer solution is that some folks have found it to be “slower” when it comes to TV tuning. ATI’s Theater 200 chip is still present, however, so you still get all of the vertical/horizontal scaling and adaptive 2D comb-filtering goodness.

The next most noticeable update is the Remote Wonder II controller, which sports a much more intuitive layout and 10 more customizable buttons for you to play with. Range is also up to 60 feet, for those of you with extremely large living rooms. Configuration is as easy as ever with ATI’s Multimedia Center Suite (now up to 9.1) and there are various plug-ins for PowerPoint, Winamp, and Guide+. The new-style dongles and break-out boxes (now in silver instead of purple) give you plenty of options ranging from S-Video, composite, and all the way up to HDTV component outputs. Cable clutter that occurred with previous versions of AIW cards is somewhat reduced thanks to the separate dongles—meaning you only use what you need.

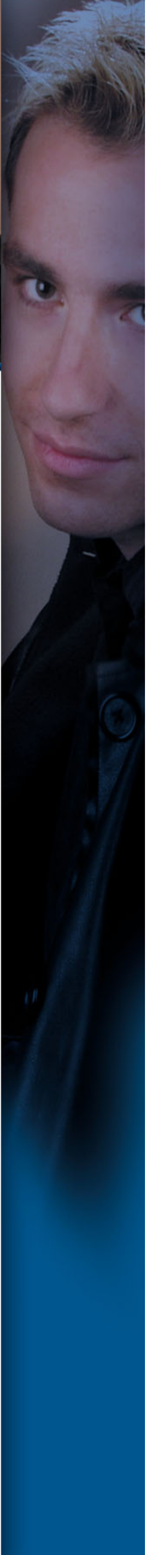
The bundled software will keep you busy. For video-editing purposes, ATI has long supplied Pinnacle Studio, so it’s no surprise to see a CD with version 9 in there. You also get Machware Mediator v7.0 and Visual Communicator. The large “Powered to play Doom 3” decal on the bottom right of the box still insinuates that the board is intended for serious 3D gaming, even if ATI’s drivers still lag somewhat behind NVIDIA’s for this game.

The X800 XT priced at $459 was always fairly desirable. Now with the X800 XT All-In-Wonder addition, you get so much more for an additional $50. There is almost no point in opting for the non-All-In-Wonder. Even if you are not into the PVR/video side of things, there is enough easy-to-use software and hardware to get you started. The performance in 3D games is identical to that of the cheaper X800 XT, so you have really nothing to loose. Having said that, this is intended for AGP users only. If you’ve made the jump to PCI Express, then you’ve done so solo and early in terms of the All-In-Wonder. Yes, it is on its way, but we don’t know when. So all in all, a job very well done, even if the arrival to the party was rudely late this time. ▲

Email me your top 10 favorite button customizations to
sharky@cpumag.com

Disrupting Reuters’ newswire with a cheery Christmas greeting at age six, Alex “Sharky” Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently overclocks/tunes Porsche 996 Turbos with www.akkuratpgi.com when he’s not tweaking PCs.

> . . . you begin to notice a purple and gold color scheme and not the usual red PCBs . . .

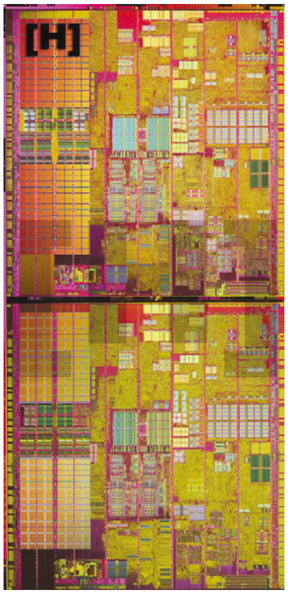


[H]ard Talk

OCing Dual Cores

by Kyle Bennett

We have given you some thoughts on dual-core CPUs here in *CPU* in the previous months, and I have a preview published at HardOCP now, if you care to give it a look (hardocp.com/article.html?art=NzU2). There are no real surprises revealed. The power of dual-core processors is going to be a boon, but its power has yet to be harnessed on the end user's desktop. Give it a couple years, though, and dual-core CPUs will be the norm, not the exception, and we'll be taking advantage of that power.



One question that's been asked repeatedly about Intel's dual core is, "How does it overclock?" For a while now, Intel enthusiasts who could deal with the heat have been getting stellar overclocks from Intel CPUs. When I talk about handling the heat, I mean this in a literal sense. Since the launch of the Prescott-core Intel Pentium 4 processors, I have been specific to suggest watercooling to folks who want to overclock their Pentium 4 processors. With the Intel Pentium Processor Extreme Edition 840 weighing in with a Thermal Design Power, or TDP, of 130 watts, you better believe that my suggestions on watercooling for current Intel CPUs isn't going to change.

If you are wondering just how hot that really is, try this to give yourself an idea: Turn on a 60-watt light bulb in a table lamp and grab hold of it. Now turn on another one and grab it with the other hand. Obviously, this is not something any sane person would do, but I hope you get the point that 120 watts is really, really hot.

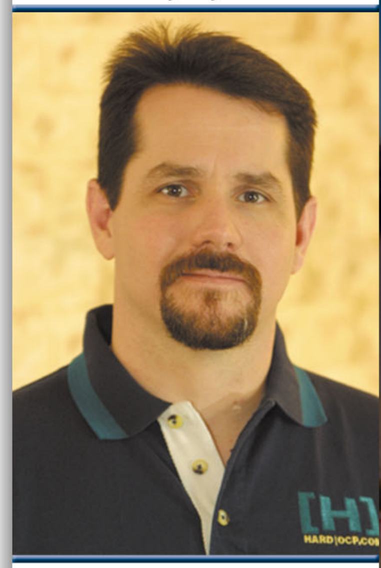
Now that we've settled on the new Intel 840 as being capable of setting a small building on fire if it's not managed properly, you know overclocking it is going to make things even worse. Aircooling can be very efficient, but the problem with computers lies in the fact that keeping a supply of fresh air to a heatsink and fan unit can be very problematic, mostly in the way of noise. If you recall last month's column, I talked about how watercooling a computer is becoming much more mainstream, and these new dual-core processors from Intel just underline that fact, especially in the enthusiast arena.

As I am writing this, I'm awaiting my first Intel 840 dual-core processor system for review from Velocity Micro (velocitymicro.com). The system sports Velocity Micro's own LiquiCool system. This is a sealed system that's billed as being maintenance-free and near-silent. Getting back to the subject at hand, though, the processor clock speed is what really stands out about the system. Velocity Micro is going to be selling overclocked Intel 840 systems that run at 4GHz. The bus speed is a reported 1,000MHz, and the memory speed is a reported 667MHz. Considering that the Intel 840 processors are stock clocked to 3.2GHz, you can certainly see that 4GHz is no small bump in speed. In fact, I know a hell of a lot of enthusiasts who are going to be very glad to see these kinds of speeds attained in a dual-core processor.

I have been hearing some silly talk of dual-core technology ending our enthusiast endeavors in terms of striving for sheer megahertz. Then again, I have been hearing about the end of overclocking for some time now, but that is for another column. If Velocity Micro's DCX line of tweaked-out watercooled systems is proof that overclocking and enthusiast tinkering is moving forward, I would have to say that things look safe for the foreseeable future.

Now to see what the AMD Athlon dual-core processors are capable of. I know there are many folks who want a snappier desktop who are excited about the new Athlons, with all that AMD gaming goodness included. Hopefully we will know a bit more about that by next month, but from what I have seen, it looks like the AMD K8 core is going to stay just as robust as it has been for the enthusiast. Assuredly, I will let you know what I see on our own test bench. ▲

You can talk with Kyle at kyle@cpumag.com.



Kyle Bennett is editor-in-chief of HardOCP.com, one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

> Now that we've settled on the new Intel 840 as being capable of setting a small building on fire . . .

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Jerry Bruckheimer
Producer

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PC Modder

Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent SFF enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community.

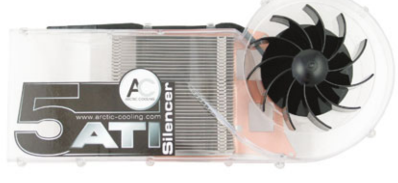
Mods & Ends

Arctic Cooling ATI Silencer 5 (Rev. 2)

Dissatisfied with the acoustic output of your stock ATI Radeon X850 XT PE? When it comes to ultra high-performance graphics, heat is a critical factor, making cooling equally important. Although many enthusiasts regard ATI's cards as quieter than NVIDIA's, ever-refined CPU coolers and fanless PSUs are leaving graphics cards as the principal noise pollution culprits.

Arctic Cooling offers solutions for ATI and NVIDIA graphics cards, replacing the standard heatsink-fan combo with a larger, more efficient design that makes less noise. The ATI Silencer 5 (Rev. 2) fits X800 and X850 cards, incorporating a 72mm fan spinning at 2,000rpm. The result, coupled with a special ceramic bearing, is an extremely quiet operation. A copper base plate and aluminum fins pull heat from the processing core, while the fan pulls cool air from inside the case and exhausts it out.

Arctic Cooling warrantees the Silencer for six years, far beyond the useful life of most 3D accelerators. At $33, it's a solid deal if you're gunning to minimize noise.



Bringing out the big guns: Arctic Cooling's Silencer is large, yet surprisingly quiet.

SilverStone Nitrogon NT01 v.2 Heatsink

Heatpipe cooling has become a middle ground between some louder air-cooled solutions of old and the latest watercooling implementations. With the help of a perpetual evaporation-condensation cycle, heatpipes quickly and efficiently pull heat from your processor, dissipating it through an array of fins at the other end.

SilverStone's Nitrogon ($47.99) leverages an advanced heatpipe structure, which reportedly is impervious to gravity, meaning you can install it in any orientation with similar performance. A copper fin array draws heat from the pipes, perpetuating the cycle. It would have been great to see SilverStone bundle preferred 60mm fans with the kit. Instead, you must choose your own and attach them to the included shroud. Of course, the fans you pick will determine acoustic output, and 60mm units generally aren't the quietest. The NT01 is pretty big, so you'll want to visit SilverStone's site for compatibility information.

Heatsink or radiator? Those massive copper fins have us wondering.

Arctic Silver ArctiClean Thermal Remover & Purifier 60ml

As hardware reviewers we go through a lot of thermal grease. And it's not like the stuff is recyclable. Every time we swap processors, upgrade a heatsink, or audition a new water block, we have to mop up the often-crusty thermal transfer material and apply a fresh coat. We're willing to bet we're not alone on this, which is why Arctic Silver's ArctiClean is such an alluring product, especially for enthusiasts.

There are actually two parts to ArctiClean. The first emulsifies and dissolves the oils and fillers present in many transfer materials, while the second removes whatever residue is left over, purportedly inhibiting flash corrosion at the same time. ArctiClean 1 is nontoxic, compared to the acetone or alcohol you'd normally use, and the concoction smells pleasantly of citrus.

If you don't often encounter the bare surface of your processor, ArctiClean probably isn't necessary. But for those who've seen dried up thermal-transfer material and the residue it leaves, this is a modest investment to help keep things clean.

Fashionably Fresh Firmware

Apple iPod Updater

This package updates the software for all iPods, adding support for iTunes 4.7 and later, and various fixes on each model.

www.apple.com

LaCie Device Updater 1.2.0

This update covers an entire line of FireWire 400 and 800 devices, rectifying an issue that resulted in data loss.

www.lacie.com

Creative Labs Zen Micro 1.02.05

Creative added three notable enhancements to this firmware and fixed three outstanding issues with the Zen Micro.

us.creative.com

by Chris Angelini

Your Photos Have Been Framed

Turn A Laptop Into Your Home's Most Treasured Computer

As you walk down the hall in my house, you will see a nice framed photo sitting on a table. If you walk by the table again later, you will notice that a different photo graces that very same frame. On closer inspection you may observe that the photograph is actually an LCD screen. Hidden inside the frame is an old laptop that's loaded with hundreds of pictures that change hourly.

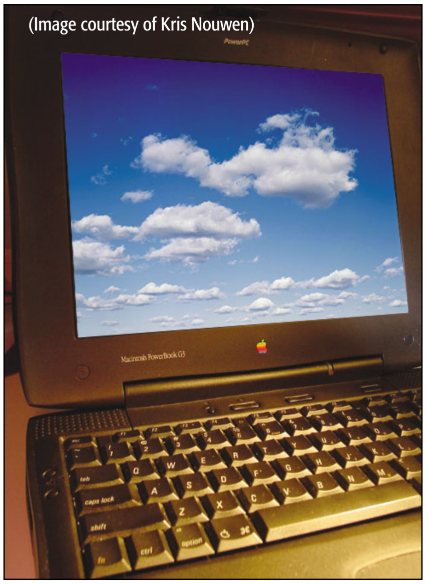
The frame is a great conversation piece and a wonderful way to exhibit digital photos that might otherwise be stuck in a photo album or buried in photo organization software. A few dollars and a few hours of effort was all it took to change the old laptop into a digital picture frame.

The project started when someone on the Freecycle (www.freecycle.org) mailing list in my area was giving away a PowerBook G3. Freecycle is a wonderful resource made up of thousands of regional mailing lists; it lets people in a geographic area give away free an eclectic mix of stuff.

As any self-respecting geek would, I immediately accepted the laptop without giving much thought as to what I would actually do with the machine. Once I received the PowerBook, I discovered that the battery didn't work, which is a common problem in older laptops. Also, this particular model couldn't run Mac OS X, which didn't make it ideal for using for daily work. I considered some interesting uses for the old machine before remembering seeing examples of digital picture frames on the Web. I decided to build one myself.

Although this project is built from a PowerBook, there's no reason you can't use a laptop running Windows or Linux to build a similar digital frame. If you were to build this project a dozen times using a dozen different laptops, the procedure would be unique each time. There's no cookie-cutter system to follow and no right or wrong way to do it. In addition, as you disassemble and reassemble the computer, you'll have to figure out which components are necessary and how to make them fit into their new case, the frame.

To start with, you will need the proper screwdrivers in order to open the machine (jeweler's screwdrivers and a set of TORX drivers should do the job), a power drill, and a shadow box frame, which is a frame that is two to three inches deep that's intended for showing off small curios.


(Image courtesy of Kris Nouwen)

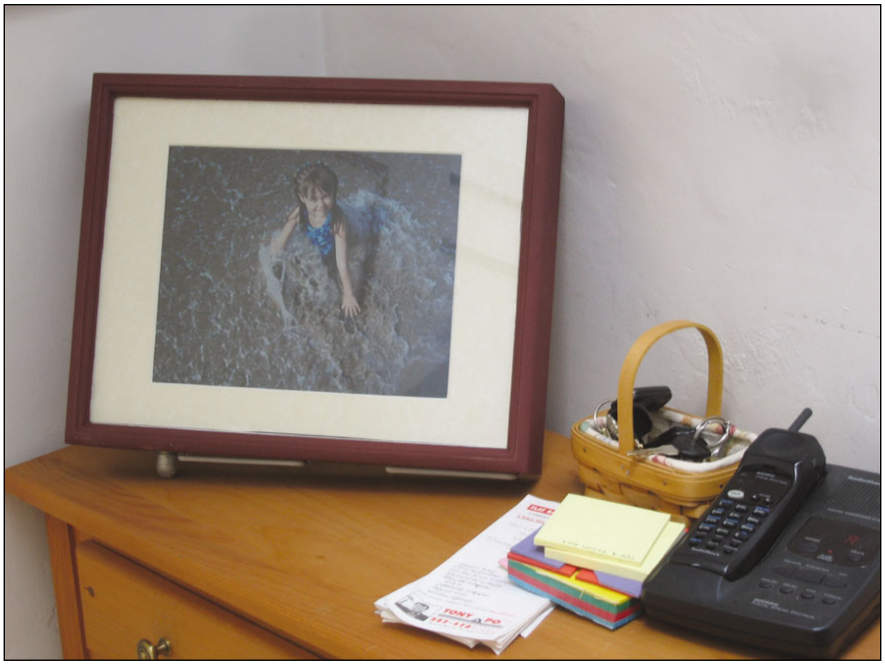
Before it was a homemade digital photo frame, it was a PowerBook G3 notebook.

I bought my shadow box frame at a local art supplies store. The store had two versions: ugly and uglier. I bought the ugly one. With help from my crafty wife, we painted it a more pleasant color. If you remember anything from high school wood shop class, you might want to build your own frame instead of buying one. You'll also need a method for mounting components inside the frame. A hot-glue gun works wonders. Finally, a photo mat that fits inside the frame will give the project a finished look.

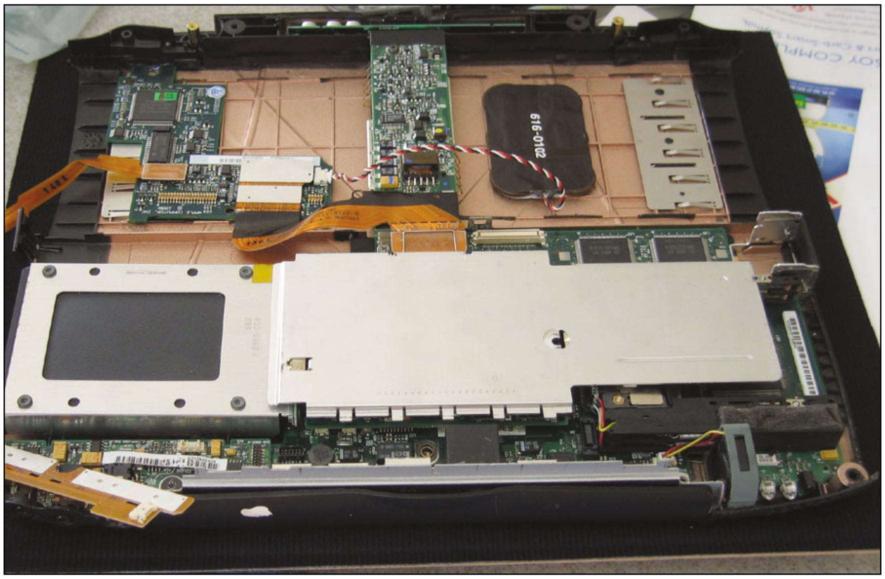
In selecting the laptop, the display is the most important feature. The notebook doesn't need a powerful CPU, but it should have a bright, backlit screen. A color screen isn't absolutely necessary, as you can use a grayscale screen for beautiful black-and-white images.

Prep The Software

It's a good idea to set up the software you will use before you actually take the laptop apart. You'll need a graphics viewer application with a full-screen slideshow mode. When the computer boots, it should automatically run the viewer program and begin showing a directory of images in full-screen mode. For Mac OS 7 through 9, JPEGView 3.3.1 (free; www.mac.org/graphics/jpegview) does the



Here's the same old PowerBook, but now it's hidden inside a frame.



When building the frame, certain components had to go. Here the base of the laptop is shown with keyboard, CD-ROM drive, and other components removed.

job nicely. DOS and Windows (even Windows 3.1) machines can use software from CShow (shareware; www.cshowplace.com). For Linux, ZGV (free; www.svgalib.org/rus/zgv) is a good choice.

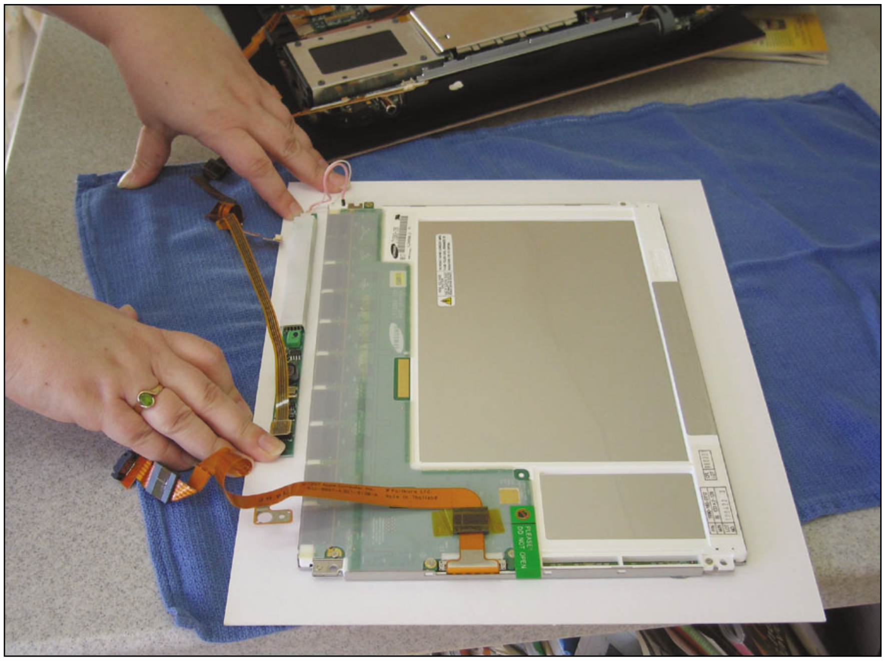
You'll also need a way to get new images into the machine after it's been built into the frame. There are several ways do this, and your choice will depend on the laptop's hardware and operating system. If the computer has an Ethernet jack, you can enable file sharing, and make sure to leave yourself easy access to the Ethernet port in your build. If the laptop has a PC Card slot, you can use a cheap wireless card to allow for access to your wireless LAN. This opens the possibility for interesting slideshows that use real-time information from the Internet, such as satellite weather or Web cam images, rather than a static set of pictures on the hard drive.

Aside from periodically adding new photos, I wanted my digital photo frame to look and act as a photograph, not just another computer that I would have to maintain. To do this you can use the preferences panel in whatever operating system you're using to make the laptop work as much as possible without your attention. I set up my laptop to require no user input as it boots (it won't, for instance, admonish me for not shutting it down properly after a power failure) and to use the Energy Save control panel to have the laptop automatically reboot after power is restored. I also used the control panel settings to leave the screen illuminated all the time but to spin down the hard drive after only one minute of inactivity.

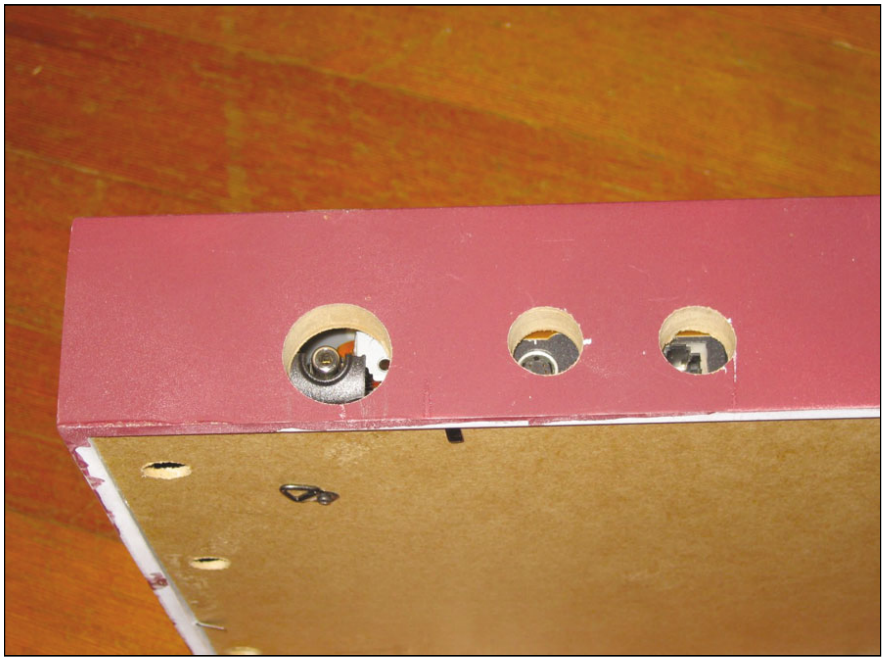
Build The Frame

Once the software is set up, start taking the computer apart. The goal is to remove the case and enough excess baggage so that you can fit the computer inside the frame. I started with the screen by first disconnecting it from the laptop's base section and then carefully removing the plastic case that surrounded the LCD. I also removed and tossed the speakers that had been mounted near the screen.

Next, I began working on the base, or the section that housed the CPU, hard drive, keyboard, and rest of the PowerBook's components. To squeeze the laptop into its new environs, I removed everything that wasn't absolutely necessary. The keyboard and touchpad were first to go, although the keyboard/mouse port remain so I can plug in external input devices when needed. The battery; CD drive; and other large, unnecessary components were next to go. If you need to, search the Web for disassembly instructions and service manuals for the laptop model you're victimizing. These can be very helpful for figuring out how



Assembling the digital frame required carefully centering and straightening the LCD on the photo mat before hot-gluing them together.



Holes hidden in the bottom of the frame provide access to the power, keyboard, and Ethernet ports, plus they allow routes for heat to escape.

to get the machine into pieces without killing it.

Depending on the laptop model and the size of the frame, you may have to re-orient the components so that they will fit in the space. Let the motherboard configuration dictate the position of the components. I removed the top of the base section (the plastic that surrounded the keyboard and touchpad) but left the motherboard installed on its plastic base for support. I then used Velcro and hot glue to affix the base section to the back of the frame.

Once I knew the exact position of the motherboard inside the frame, I used a half-inch drill bit to drill holes in the bottom of the frame for access to the power, keyboard, and Ethernet ports. These holes let me add pictures without opening the frame. I also drilled a few holes in the back of the frame to allow heat to escape. A piece of cardboard and small pieces of foam keep the motherboard isolated from the LCD.

The screen was the last component I placed. After carefully aligning it with the edges of the cardboard mat, I hot glued the LCD to the inside of the mat. I inserted the mat and screen into the frame, reconnected the screen to the motherboard, and closed the frame. The project was complete.

Positioning The Frame

In your project you'll need to consider whether you want to primarily show vertical or horizontal pictures and then orient the frame accordingly. When you display horizontal images in a vertical screen or vice versa, black bars at the edges of the screen can ruin the illusion that it's a real photograph. I opted for horizontal images to show landscape photos that were taken on vacations.

A more industrious person might want to hang the completed frame on a wall, but this would mean hiding the power cord, which is another project entirely. It's easier to place the frame on a table with the cord nicely tucked away. You can use a standard kickstand-style frame to keep the frame upright. My frame seemed too heavy to balance on a little piece of cardboard, so I opted to use a pair of metal plate holders, which are strong enough to hold the weight.

In the months since I built my digital picture frame, the ever-changing images have brought smiles to those who pass by it. The next time a spare laptop finds its way into your life, consider building a frame for yourself or a friend.

by Kevin Savetz

Mad Reader Mod

THE TRICKS UP TEASER'S SLEEVE

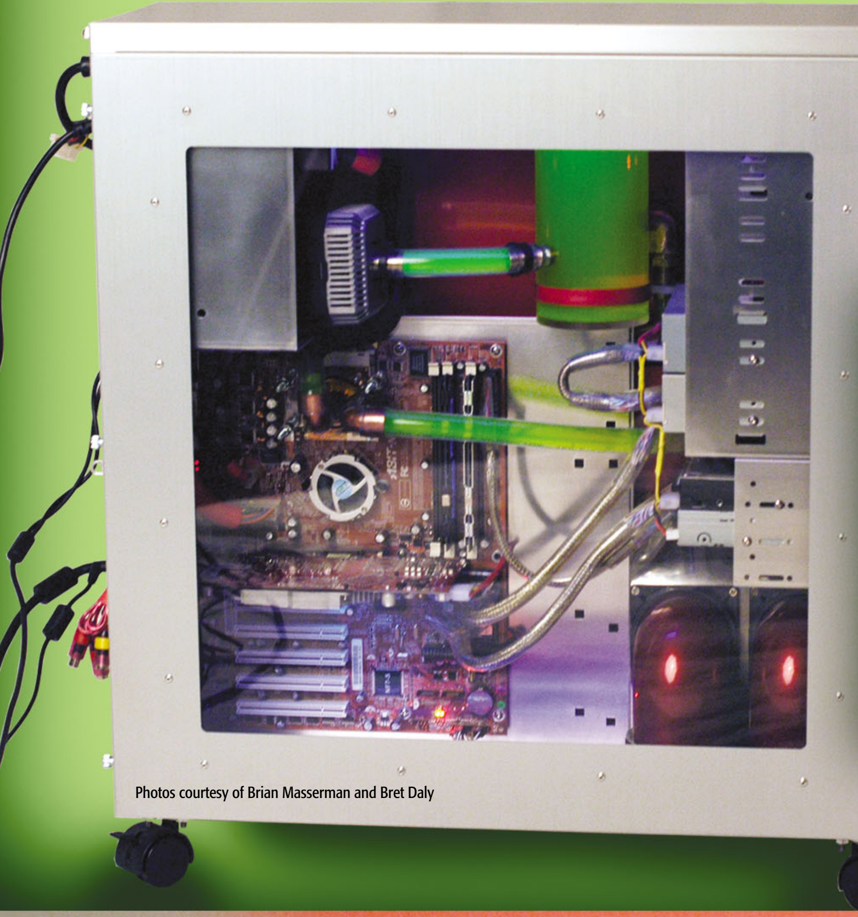
What LCD? Rather than slap an LCD onto the front panel, Daly pieced together a rail setup that lets him store the display inside the computer.

When we browse "Mad Reader Mod" submissions and online worklogs, we see more than a few rigs that have a not-quite-done look. Stray wires are common, and we also see plenty of watercooling setups that have long, unwieldy tubing. Teaser is quite the opposite. From its mirror-finish radiator shroud to its stealthed LCD, the system is polished. "I wanted my mod to be unique, ultra clean, and free of the typical spider web of hoses and wires," says Bret "SoulsEnd" Daly.

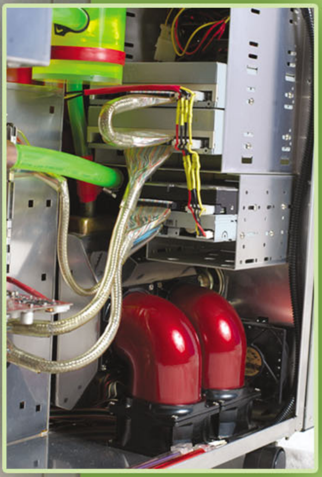
Daly, chief editor of ModdersHQ.net, handcrafted the acrylic water reservoir and then carefully cut the tubing to the appropriate lengths. He also used rounded data cables and tucked the power cables out of the way, giving the system an unusually empty look. Next, he focused on the radiator, which requires constant cooling airflow. After building and polishing the radiator shroud, Daly attached PVC pipes and matching Vantec Tornado fans. Thanks to the aptly named fans and a filtered window behind the radiator, this cooling system expels hot air under the chassis, protecting the air inside the computer.

Of course, the cooling mods aren't the only tricks up Teaser's sleeve. Pull the handle on the front panel and you'll find a fully functional LCD that swings up to display the Windows Desktop (in addition to Daly's monitor). Daly credits his friend, Goatrat, with the LCD mod idea, which includes aluminum U-channel rails and hinges that let it swing into position. When the LCD mod isn't tucked out of sight, Daly uses the extra screen real estate to display Winamp and system info. ▲

by Joshua Gulick



Photos courtesy of Brian Masserman and Bret Daly



The shroud prevents air from escaping into the chassis. Daly put about 10 hours into the shroud's mirror finish.

Daly attached acrylic endcaps to a seven-inch cylinder to create the reservoir.

Give Us Your Mod

Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. If we include your system in our "Mad Reader Mod" section, we'll send you a $1,500 Newegg.com gift certificate and a one-year subscription to *CPU*.

Yep, Teaser has it's own LCD. It generally houses Winamp and other utilities, but it's always ready for a fight.

Daly pulled from his automotive technician experience to weld the steel radiator shroud.

The recipe for bright red exhaust tubes is PVC tubes, red metallic paint, and plenty of time. Daly wet sanded and polished the pipes to bring out the shine.

That's a copper Danger Den TDX waterblock. Note that every cable is almost taut; sagging cables don't exist in Teaser.

The filter window lets cool air in while the rheostat-controlled 80mm Vantec Tornado fans force the warm air out.

advanced Q&A corner

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Pr1s0ner asked: I'm having a small problem with a computer I built less than a month ago that intermittently restarts. It usually happens about once a day, although it did crash twice in one day a few times. It's a very odd restart because Windows doesn't show me any error messages. I'll be working away on something (in a wide variety of applications), click a button, the screen will just go black, and then the system will boot up again in a few seconds. I don't think heat is a factor because I've checked the temperature after the restart and it has never been over 35 degrees Celsius. In fact, I haven't been able to get the system over 43 C while stress testing it. I'd also like to mention that MemCheck doesn't usually find any problems. But on one occasion I ran MemCheck for a while, and on one pass it did pick up 31 errors in test No. 4; but in all subsequent passes it found no errors. This made me think I have a memory problem, but MemCheck hasn't reported any errors since.

A: Although there is a good chance that you do have a marginal stick of memory in your system, as MemCheck has reported, the problem that you've described is actually typical of a faulty power supply. For a system to remain stable, it's paramount that the system has a clean and consistent supply of power. If your power supply isn't up to par, the voltage output from its 3.3V, 5V, or 12V rails could dip below or peak above a certain threshold, which would then cause the system to spontaneously restart. Try running a program such as Motherboard Monitor or SpeedFan on your system for an extended period of time and pay special attention to all of the supply voltages. If you see any wild fluctuations, and then the system restarts, your power supply is probably at fault.

The capacitors located in your motherboard's voltage regulator module could also be the root of your problem. Some motherboards built between 2001 and 2002 were equipped with faulty capacitors that regularly failed. When these capacitors begin to fail, they're no longer capable of properly filtering the supply of power, which will cause system instability. And if they fail completely, the system won't boot at all. Take a look at the caps on your mobo and make sure that none of them are bulging, severely tilting to one side, or leaking a brownish fluid. If any of the caps on the board look questionable, you'll either have to whip out your soldering iron to replace them or buy a new motherboard. There is also a chance that your home AC current is excessively "dirty," so make sure your system is plugged into a quality surge protector and/or UPS.

> "As a rule we would say the best combination of motherboard chipset and graphics card is within the same chip supplier."

Joey D. asked: **I recently built a powerful new workstation/gaming rig and would like to know what you suggest for benchmarking software in order to get reliable reference scores on how my new baby stacks up vs. my previous system and others I have access to. I have some ideas myself but wanted insight from an expert. I built up a Pentium 4 660-based system with an ASUS i925XE motherboard, an ATI Radeon X800 XL graphics card, 2 Gigs of Kingston HyperX DDR2 DRAM, and Western Digital Raptor 10,000rpm SATA drives. I'd like to know a few tests that you could recommend for CPU, Graphics, and Hard Disk testing. Thanks!**

A: Great question, Joey. Thanks very much for asking it. There are a myriad of benchmark utilities out there these days. Some of them are good, while others aren't so good. First, let's talk a bit of philosophy here. The main goal of any benchmark analysis you do should be to translate the results of that benchmark into real-world application performance. In addition, there are many tests that we would classify as "synthetic" benchmarks, but their relative value is limited because you'll only use the program for that specific benchmark test. Our opinion is that synthetic benchmarks can offer some insight into performance, but should only be used as a supplemental check in conjunction with benchmarks based on the actual application software you like to run. With that said, the next paragraph contains examples of benchmarks and other tests we like to run at HotHardware.com. You can search for many of these titles on the Internet and you'll find a few of them free of charge or for a nominal fee.

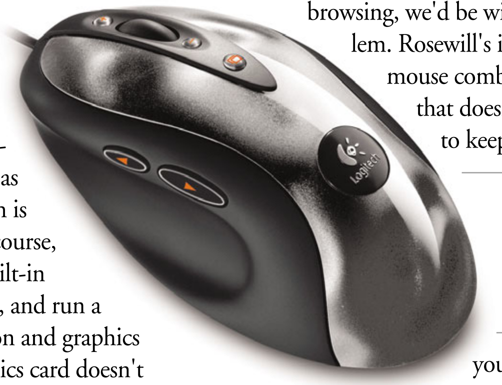
If you're into 3D rendering and modeling, we would suggest SPECViewperf and Cinebench 2003. Viewperf consists of a number of 3D modeling and rendering tests based on applications such as Maya, 3ds max, Catia and others, while Cinebench is based on Cinema 4D from Maxon. And then, of course, you can fire up any of your favorite games with built-in benchmark capabilities, such Doom 3 for example, and run a time demo. You'll want to turn down the resolution and graphics detail settings in the game, however, so your graphics card doesn't create a bottleneck and lets that P4 push the polygons as fast as possible. Finally, for synthetic CPU and Memory performance testing, we would recommend SiSoftware's Sandra suite of benchmarks. Again, they're not based on any real application tests but do give you a sense of performance on some basic compute functions vs. a database of reference scores that come within the test suite.

Choosing the correct benchmark path for Graphics testing is fairly easy. Or is it? In actuality, all you have to do is decide which games and game genres are important to you and then find a way to benchmark them. Therein lies the rub: You can't easily benchmark all games. For OpenGL-based gaming, Doom 3 is great as a FPS benchmark. You can even record your own time demo from your favorite map area and benchmark with that. It's also easy to benchmark and provide demo recording capabilities with DX9 titles such as Far Cry and Half-Life 2. If you are into driving or flying sims or any other type of game, you can always use Fraps (www.fraps.com). Fraps is a frame-rate counter and logging program that lets you look at average frame rates, over any specific gameplay duration you have it activated, in Windows' background.

Finally, for Hard Drive and Storage subsystem performance there are a lot of benchmarks that have a synthetic "feel" to them because many, such as HD Tach, Sandra's disk performance module, and IO Meter, read or write large amounts of data while measuring throughput. All told, the process of measuring drive performance is a fairly sterile throughput analysis, anyway. You could, however, time how long it takes your new system to boot or how long it takes to load your favorite application or game level and go from there; but remember that system drivers and even how full a hard disk is can affect drive subsystem performance. Happy benchmarking!

Mario T. asked: **I just finished building a new system for playing games and am having a really annoying problem. The system is stable and doesn't crash after hours and hours of gaming, but anytime the action in a game gets intense, and I have to quickly aim at multiple targets, my crosshairs seem to either freeze or jump all over the screen. Other than that, the system is working fine. The mouse works fine while I'm browsing or working with PhotoShop, but it freaks out in games. For reference, my system uses an Athlon 64 3200+, 1GB RAM, a GIGABYTE K8NSNXP-939 motherboard, a GeForce 6800GT, and a 120GB Western Digital HD. I also have a 17-inch Sony CRT monitor and a Rosewill wireless keyboard and mouse.**

A: Even though your mouse seems to work well while you're browsing, we'd be willing to bet it's the root of your problem. Rosewill's inexpensive wireless keyboard and mouse combos ship with a basic optical mouse that doesn't have the resolution or sensitivity to keep up with fast-moving hands. On your Windows Desktop, try moving the mouse back and forth quickly and you'll see that your cursor won't track properly. It's not just your games that it has a problem with, it's the fast movements. A mouse has to have a relatively high resolution (800dpi or greater) and the ability to quickly track acceleration in any direction for it to work well in a fast-paced action game. Should you want to stick with a wireless setup, we like Logitech's Cordless MX Duo or MX 3100 kits. However, your best bet for gaming is a wired configuration. Just about any quality keyboard will do, think Logitech or Microsoft, but look into Razer's 1,600dpi Diamondback gaming mouse, Logitech's MX 518, or even Microsoft's IntelliMouse Explorer 3.0. All of these mice should work well for you and make your jumpy crosshairs a thing of the past. ▲



Logitech's MX 518 gaming-grade optical mouse is an excellent choice for fast-paced gaming that requires quick hand movements.

by Dave Altavilla and Marco Chiappetta, the experts over at HotHardware.com.

For bonus content, subscribers can go to www.cpumag.com/cpujun05/q&a

Gigapixel Photography

High-Resolution Camera Projects Make A Sharp Mark

When it comes to camera resolution, advances typically are measured in megapixels. But if you want your camera to capture the slightest detail, no matter how far away it is, you'll want to soar past megapixels and start thinking about gigapixels.

A handful of projects are underway to develop and harness the power of large-resolution cameras that can produce 1GP (gigapixel) and higher resolutions. These cameras aren't aimed at the consumer market and probably won't ever be, but the cameras have important implications for different areas of scientific study.

The R1 Project

Sandia National Laboratories is working with photographer and artist Clifford Ross and New York University on a camera Ross invented called the R1. The R1 offers amazingly sharp detail. For example, a panoramic mountain view in one photo (from the prototype model of the R1) let viewers see a footpath on a mountain. Not overly impressive—until you learn that mountain was seven miles from the photographer.

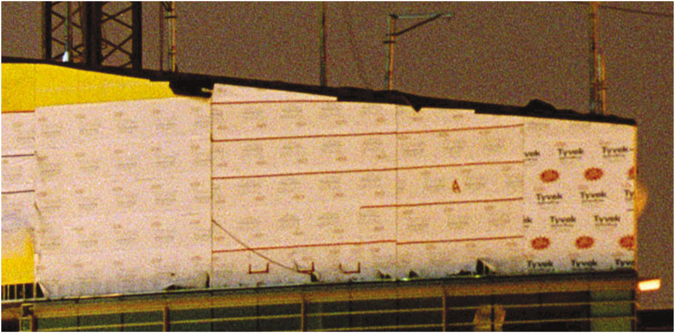
Ross' R1 camera (www.cliffordross.com) provides such amazing detail that the technology behind it is of interest to people beyond photographers, which is where Sandia enters the picture. Sandia scientists are interested in the technology's ability to display massive amounts of information. The scientists say researchers only can understand such complex data sets through human intuition, and current display options cannot present the needed information in a useable format.

Working with Sandia scientists, Ross is hoping to construct a second version of his camera that will capture up to 6GP of resolution within 1/15 of a second. He's also hoping to create a high-resolution display system that will show the images.

Ross has pieced together a collection of extremely low-tech parts—a microscope, mirrors, and parts from old cameras—to create a camera that can capture images on extremely large negatives, measuring 9 x 18 inches. Although none of the components in the R1 are "high tech," Ross must scan the negatives into a computer to create a lifelike digital image and use Adobe Photoshop software to make the image's colors realistic.

The Gigapxl Project

Ross and the Sandia scientists are not the only ones working with gigapixels. Those designing the Gigapxl Project (www.gigapxl.org) are working with a 4GP camera. The initial goal of the Gigapxl Project was to create a camera that could challenge film-based, large-format



These images of the nighttime San Diego skyline from the Gigapxl Project Web site show the amazing detail in a 4GP (gigapixel) resolution image. The "zoom" image is of the construction occurring on the building on the right side of the overall image. (*Notice how you can read the brand name of the construction products in use.*)

Photos courtesy Gigapxl Project

Gigapxl Project Timeline

The Gigapxl Project started in 2000 and three years later had its first prints on display in a museum.

2000	2001	2002	2003		2004	
September 2000 Initial design work on Gigapxl camera begins.	**March 2001** First test photographs taken.	**October 2002** First photographs published to the Web.	**May 2003** A new Gigapxl camera is completed.	**September 2003** First images appear in the Palace of Fine Arts in San Francisco.	**November 2004** The Gigapxl Project Web site launches.	**December 2004** The 1000th image in the Gigapxl Project is recorded.

photography, which typically offers about 100MP resolution.

Physicist Graham Flint is leading those involved with the Gigapxl Project. Flint's camera hardware weighs more than 100 pounds. The camera body is a magnesium alloy. To lower the camera's overall weight, Flint didn't include a motor for automatic film advance and added an aluminum frame to the camera, which can connect to a tripod.

The camera uses some parts designed for spy cameras. In fact, the Gigapxl camera's design uses many components specifically from 9- x 18-inch military reconnaissance cameras, including the Air Force K-38 camera and the Navy CA-13 camera.

Flint is traveling the country, shooting high-res photos of public monuments and nature scenes. Photographs taken for the Gigapxl Project aren't available for download; however, the Gigapxl Project Web site does have several of its images available for viewing at smaller resolutions. The images showcase the amazing detail available in the high-res photos.

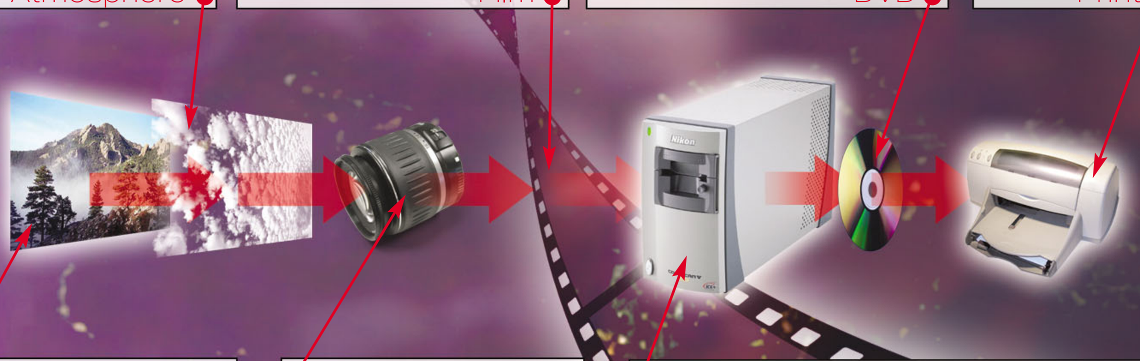
Certainly, high-resolution cameras and images have been around for many years, but they've been designed for specific purposes such as high-altitude spy photographs. By adapting their cameras, Ross and Flint have sparked technologies and ideas beyond photography including potential improvements in display technologies.

Then there are the amazing images. Those are pretty cool, too. CPU

by Kyle Schurman

Gigapixel Photos

To create a gigapixel-resolution photo, the image is recorded on a negative and scanned making it a digital file. Each step in the process causes some loss of image quality. Photo-manipulation software gives the photographer an opportunity to clean up the image and fix this problem. These graphics show a blend of the gigapixel-photo processes that Clifford Ross and Graham Flint use.



For gigapixel photos, the atmosphere is a key component to creating photo sharpness. As light rays travel through the atmosphere to reach the camera, the image can lose quality because of atmospheric conditions such as thermal heat. Dust in the air can affect photo quality, as well.

Atmosphere

Several types of films could provide the proper resolution for a gigapixel photo. However, some extremely high-res films only work in black and white; others don't allow extreme depth of field, which is required for a gigapixel photo. Flint uses film for aerial photography that records resolutions of 4,000 pixels per inch. Both the R1 and the Gigapxl cameras use a vacuum pump to flatten the film within a fraction of an inch, which helps properly record the high-resolution image.

Film

Because of compression, the final images will fit on a standard DVD. However, when using an uncompressed file with 16 bits per component image, a 4GP photo will occupy 24GB of storage space. To fully display a 4GP image on standard PC monitors with 1,280 x 1,024 resolutions, you would need a line of about 70 monitors wide and a stack of about 44 monitors tall.

DVD

To make a print, the Gigapxl team creates four 96- x 48-inch print panels and then combines them to create the final overall image of 96 x 192 inches.

Print

Scene

A high-resolution photo can reveal detail in a scene that's not readily visible to the human eye. In one of Ross' photos, when the user zooms in on a segment of the overall photo, you can see a bird hiding in the tall grass several hundred yards away from the camera.

Lens

Flint's camera includes micrometer screws that adjust the lens focus to within 1/1000 of an inch to create a photo. He uses a laser range finder to measure the distance to each prominent item in the photo and then adjusts the screws to allow for the best possible focus field.

Scanner & Software

When scanning the negatives, the photographers use a resolution of about 50 to 100 pixels per mm. Some scanners can handle the full 9- x 18-inch negative; other scanners must scan the negative in pieces and then splice the pieces together using photo-manipulation software. The Gigapxl team can scan a 9 x 18 negative at 80 pixels per mm in about 19 minutes. Because of the scanning process and the digital file end product, those involved with these projects refer to this process as digital photography (it differs from what consumers consider digital photography). With the Gigapxl Project, Photoshop CS software handles the large files that run on two custom-made PCs. With the R1 project, Ross uses film designed for aerial photos. Photos taken with this film have sharp contrast but muddied colors, which is why Ross' team uses Photoshop to restore the colors.

Sources: Gigapxl.org and CliffordRoss.com

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Preserving Digital Data

It's Far More Than Recording & Forgetting

Finding a way to keep historically significant paper documents from deteriorating can create a lifelong project for historians. Determining the best way to preserve paper documents can be a difficult, time-consuming chore. This is changing, however.

As computers generate and store more data, historians must determine the best methods for preserving *digital* data. It's not only important to preserve the data itself but also to preserve the mediums, such as CDs and DVDs, that carry and store that data. And even before those mediums begin to deteriorate or become obsolete, it's important that the discs' owner makes proactive changes to his digital data archive before the problem becomes critical.

The Project

This is where the National Digital Information Infrastructure and Preservation Program (usually shortened to NDIIPP or the Digital Preservation Program) enters the picture. This federal government-funded program, led by the Library of Congress, involves many public and private entities. It involves studies of several types of digital data and storage mediums.

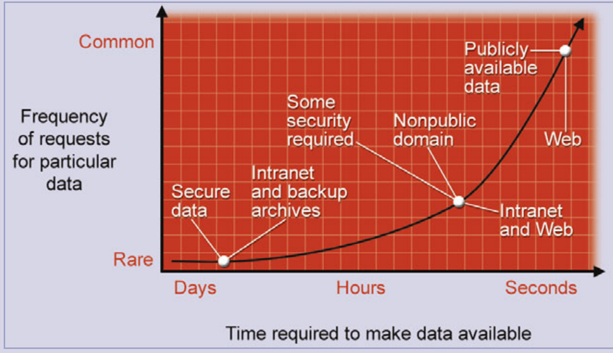
The Digital Preservation Program aims to preserve and organize today's digital data for future generations. Work on the project began in the late 1990s and continues today. Congress passed a bill establishing the Digital Preservation Program in December 2000. Those developing the Digital Preservation Program have identified a few key characteristics for the program.

First, it's important that any plan allow for different storage systems and mediums. Any preserved digital data must work with both existing and future systems, which requires a minimal, but effective, architectural model for preserving digital data. An overly complex system would have difficulty matching all possibilities.

Second, the plan must be useable for searching purposes. The sorting or identification system must include the digital data format, as well as a good description of the digital data. However, those working on the Digital Preservation Project say it's important to make sure that any sorting system doesn't become bloated, making it impractical to implement and use. Because the sorting system will be used in different locations and across different computer systems, it's extremely important that it be practicable for use and efficient.

Third, as the Digital Preservation Project's core plan says, preservation of digital data is more than storing it and forgetting about it. Preservation of digital data also involves ensuring the authenticity of the data by preventing tampering. It involves

Current Government Projects



As part of the process of making the data available, the entities hosting the data must organize it to make accessing the data as easy as possible when appropriate. However, when data isn't part of the public domain or when it may require some specialized security measures, the organizational model must be able to accommodate any steps required to access that data. Here is one common base model. ▲

Some of the work that specific federal departments are performing includes:

- The National Agricultural Library, a division of the Department of Agriculture, is working to combine historical printed material with its current online, digital offerings to create the National Digital Library for Agriculture. The digital library's capabilities need to be flexible because it will contain a variety of text, images, video, and databases.
- The National Library of Medicine will acquire, organize, and preserve materials pertinent to medicine. Such materials may range from 125-year-old medical journals to modern 3D renderings of medical procedures. The medical library will offer many types of information online, including databases, historical and current texts, images, video, and vocabulary lists.
- The NARA (National Archives and Records Administration) is working on the Electronic Records Archives project. As part of the project, NARA wants to preserve documents created in any type of application on any type of computer from federal entities and from donors. The project's goal is to make all federal records available digitally, regardless of any technological changes in the future.

avoiding data losses by preventing degradation of media via hardware and software malfunctions and breakdowns. Perhaps most importantly it involves monitoring hardware and software changes and technological improvements that could render the archived data obsolete.

To fulfill these characteristics, the Digital Preservation Program will require active management of the content.

The Challenge

The Library of Congress isn't the only organization interested in finding better ways to organize and preserve digital data. Businesses need to preserve data and make it easier to sort and analyze. And, individuals are relying more and more on digital data for important documents, not to mention irreplaceable digital photographs.

The nature of digital data makes the job of preserving it challenging. The various mediums on which digital data is stored also present some individual challenges.

For example, try an Internet search, and you'll quickly see a problem with preserving content from the Web. A recent study from

Preserving CDs & DVDs

Unlike historians for federal government departments, most computer users aren't interested in preserving terabytes of data as outlined in the Digital Preservation Program. However, individual users can use some of the lessons discussed in the program for their own situations. For example, if you want to protect your digital files by creating backups on CDs or DVDs, you need to be proactive when caring for your data. Although the tips here focus on disc shelf life and data degradation prevention, a greater risk to your data stored on optical discs comes from advances in technology. Combat this problem by updating your data archives with the latest technology when required. ▲

Dos & Don'ts

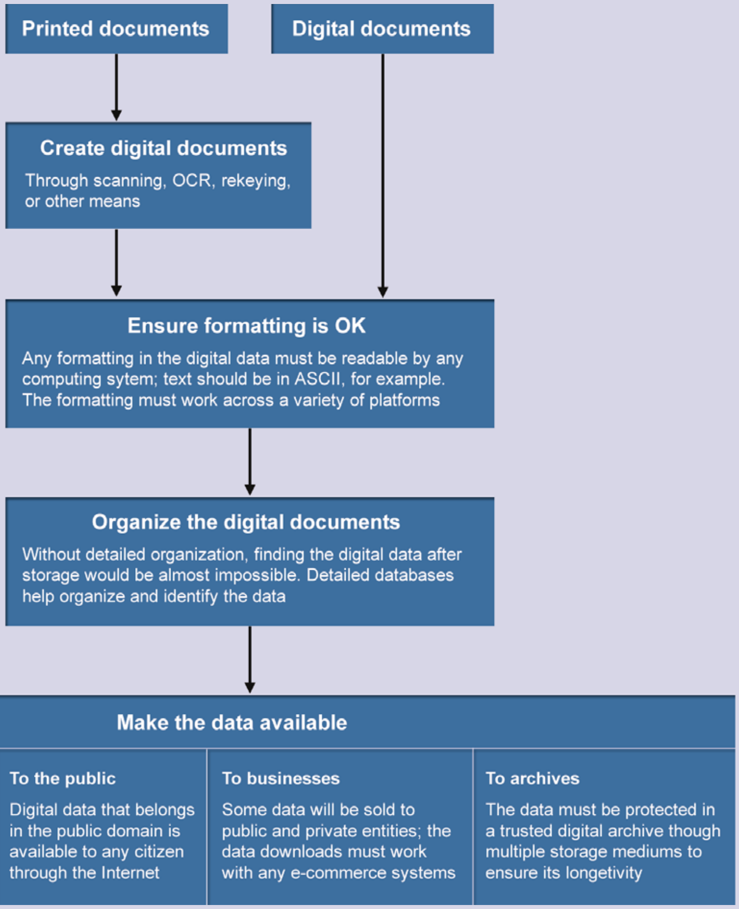
Here are six tips for keeping your optical discs in the best possible condition for the longest amount of time.

DO handle discs by the outer edge of the center hole.
DON'T expose discs to high heat or humidity.
DO store discs in a cool, dry, and dark environment.
DON'T open a CD-R or CD-RW disc package until you're ready to record on the disc.
DO keep discs in their original package or jewel case whenever they aren't in use.
DON'T clean the discs by wiping in a circular motion around the disc; instead, wipe from the center to the outer edge in a straight line. ▲

Source: National Institute of Standards and Technology and Library of Congress

Diagraming Government Projects

Several departments of the federal government are working on and implementing plans to meet the needs of the Library of Congress Digital Preservation Project. The diagram shows some of the steps governmental entities often follow to protect digital data and to make all public data available, regardless of the technology in use.



Create digital documents
Through scanning, OCR, rekeying, or other means

Ensure formatting is OK
Any formatting in the digital data must be readable by any computing sytem; text should be in ASCII, for example. The formatting must work across a variety of platforms

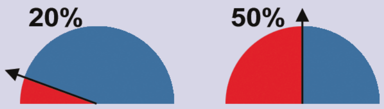
Organize the digital documents
Without detailed organization, finding the digital data after storage would be almost impossible. Detailed databases help organize and identify the data

Make the data available

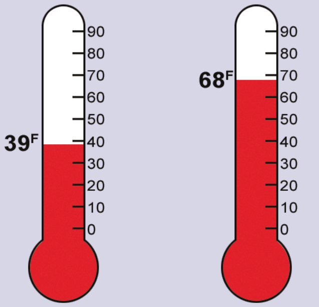
To governmental entities	To the public	To businesses	To archives
Local divisions within the department and other federal departments must have easy access	Digital data that belongs in the public domain is available to any citizen through the Internet	Some data will be sold to public and private entities; the data downloads must work with any e-commerce systems	The data must be protected in a trusted digital archive though multiple storage mediums to ensure its longevity

Sources: National Agricultural Library, National Library of Medicine, National Archives and Records Administration, Institute of Museum and Library Services, and Library of Congress

Storage Tips

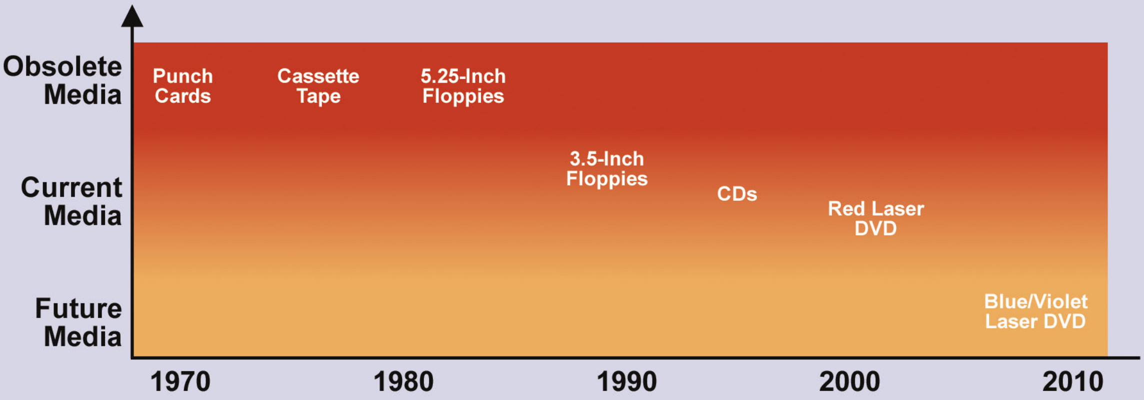


DVDs and CDs will last longer when stored at temperatures between 39 and 68 degrees and at humidity levels between 20% and 50%



Timeline Of Media

Several types of storage media have served as the industry standard but became obsolete within a couple of decades. This timeline shows the possibility that CDs and DVDs could follow the path of their storage predecessors. ▲



Media introduction dates (approximate)

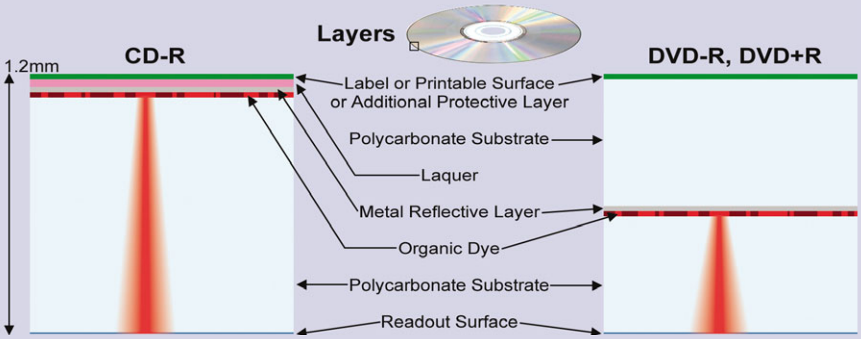
the Library of Congress showed that 44% of Internet sites were no longer available one year later. The Library of Congress, calling such data "fragile and inherently impermanent," wants to make certain it can capture important data before it disappears. The immediacy of the Internet gives libraries and historians another problem: Determining what is valuable and making the determination quickly enough to capture the data.

Storage mediums such as CDs and DVDs don't last forever because of natural degradation of the medium. (See the "Preserving CDs & DVDs" graphics on on this page and pages 48 to 50.) Older data stored on a floppy diskette or a tape lasts an even shorter time before it degrades. Preserving data on these storage mediums requires some special handling and care.

There are also different preservation concerns for different types of content. For example, will a text file be able to carry its

Record-Once Discs (CD-Rs)

The data layer in a CD-R uses a layer of organic dye to record the data. You can't change the data once it's recorded. Different manufacturers use different types of dye. These organic dyes are photo-sensitive, meaning excessive light will damage the discs. CD-Rs use gold, silver, or a silver alloy in the metal reflective layer. Gold is less susceptible to corrosion than silver, but silver is more reflective than gold. Typically a well-made CD-R will not suffer from corrosion because moisture won't penetrate the disc's seal. Even though aluminum is less expensive, it isn't used in CD-Rs because it reacts with the dye. Most manufacturers say you can store the discs for five to 10 years before recording. The dye used in such discs will eventually break down. (Heat, visible light, and UV light accelerates this process.) Direct sunlight can make a CD-R unusable in just a few days under the right conditions. ▲



fonts and layouts through different software and hardware formats? Is a video file worth preserving if its audio quality is poor?

These types of questions are difficult to answer. Those preserving the data almost must be able to see into the future, attempting to determine the file formats that will remain viable in the future, while determining the data that will have lasting importance.

In both instances it's obvious that with any digital data preservation plan you must be proactive with the data. You *could* create a CD containing your family photos, intending to give it to your grandkids in 50 years, but will a computer exist that will be able to read it? Although it seems likely to us today that backward compatibility for computer hardware and/or software will always exist, there aren't any guarantees. For example, how many new computers don't include floppy diskette drives, which were vital to computing just 10 to 15 years ago? And don't forget the completely abandoned technologies, such as 5.25-inch floppies and tape drives, that were key to PCs in the past.

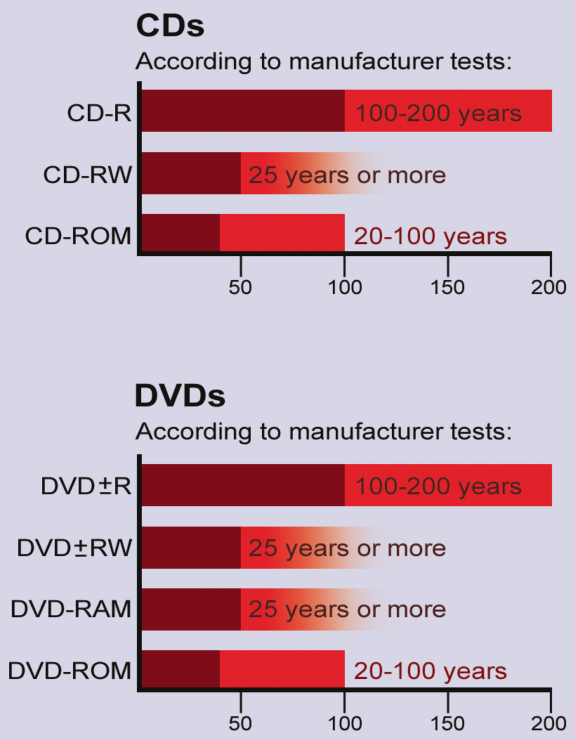
As technology continues to evolve, the ability to preserve digital data will require some work from the user to ensure up-to-date and easily accessible data—even if he's only storing a few hundred family photos on a burned CD.

Preserving digital data isn't like creating a paper photo scrapbook and then putting it in a box until your grandkids are ready to enjoy it. It requires shifting the data from medium to medium as technology dictates. If you do follow a proactive plan, your grandkids, great-grandkids, and beyond can easily enjoy your *digital* photo scrapbook.

by Kyle Schurman

Life Expectancy Of Optical Discs

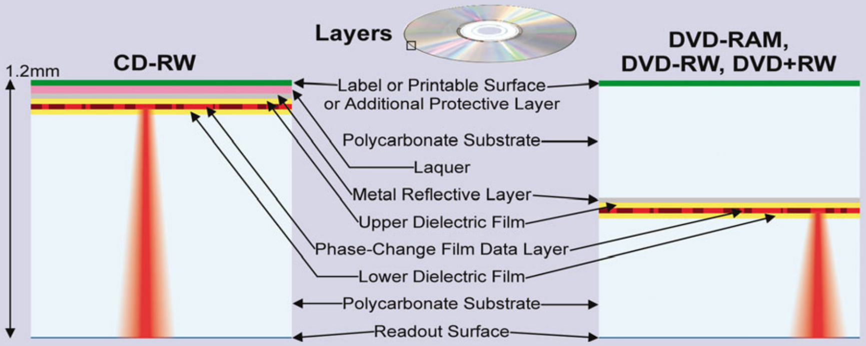
A few factors affect the life expectancy of both CDs and DVDs, such as manufacturing quality, handling methods, storage environments, and quality of the recording mechanism. As a result of the error-correction capabilities of optical discs, users might not notice a slow degradation of the disc because the disc drive may continue to read the disc, even if it has a few errors. ▲



According to NIST estimates:
Recordable DVDs, about 30 years
(assuming storage at 77 degrees F
and 50% relative humidity)

Rewriteable Discs (CD-RWs Or CD-RAMs)

The data layer in a CD-RW and a CD-RAM is a phase-changing metal alloy film. You can change the data these disc hundreds of times. Only high temperatures, such as those generated by a laser, can affect the metal alloy. Disc rot, which refers to the oxidation of the aluminum metal reflective layer, can affect CD-ROM discs. Early rewriteable discs and poorly manufactured rewriteable discs are susceptible to moisture penetrating the disc seal, allowing moisture in the air to cause oxidation (disc rot), which diminishes the reflectivity of the layer, leaving the disc unreadable. However, disc rot is more common in CD-ROM and DVD-ROM than in CD-RW because you're more likely to find a poorly manufactured CD-ROM. The phase-change layer on rewriteable discs breaks down naturally faster than the dye in CD-R, so you won't want to use CD-RW for long-term storage. ▲



"When paired with a suitably high-end A/V receiver, the RBH CT-MAX will rock your home theater to its foundations."
- Steve Guttenberg, *c|net.com*

In either stereo or multichannel modes, the RBH excelled at producing a cleanly defined soundstage, with imaging uncluttered by any hint of a box or multiple drivers…The result is that the Compact Theater convincingly disappears as a sound source.
-Neil Gader, *The Perfect Vision Magazine*

With its die-cast aluminum construction and aluminum woofers, the RBH CT-MAX delivers "foundation rocking" performance, yet won't rock your budget to its foundations.

RBH's Compact Theater systems offer the unparalleled value and incomparable attention to detail which have come to be expected from RBH.

The CT-Max is also available with the MS-10.1, featuring dual 10-inch active woofers, RBH's TAV™ technology and a 250-Watt RMS built in amplifier.

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WORKSTATIONS 101

58 WORKHORSE WORKSTATIONS
A DIFFERENT KIND OF POWERFUL

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THE WORKSTATION JUGGERNAUTS DO BATTLE

LIFE AFTER THE DESKTOP

You can't open your eyes without seeing the evidence of workstation computers all around you. Your car, your furniture, the weather forecast, every electronic device made in the past decade, every game in your Xbox or PlayStation, the clothes you wear, the movies you see—practically everything within the man-made world now involves the use of workstations. If something needs to be designed, edited, compiled, or visualized within the professional realm, chances are there's a workstation doing the job. Moreover, if you're the type who handles these applications, either as a hobby or a growing source of income, and you find yourself frustrated while your system grinds against its bottlenecks, perhaps you're about ready for a workstation, too.

Workstations Defined (Sort Of)

We found it nearly impossible to formulate a solid definition of a workstation by talking to manufacturers. Disk drive vendors emphasize SCSI RAIDs. Graphics card vendors give you the impression that workstation-ness hinges on the GPU and certified compatibility with key applications. CPU manufacturers stress dual processors, cache, and memory. The situation grew even more confusing when we talked to workstation users, finding that some followed traditional workstation models while others didn't.

Ultimately, Alex Herrera, an analyst with JPR (Jon Peddie Research), sums it up best:

"People want something to point to and say, 'Well, if it has that, that, and that, it's a workstation.' To some degree, you can do that in the midrange and above, but we say that a workstation is a machine in which a vendor has done something to it to promise a professional user something that they value. The elements that make a machine a workstation could be things like dual processors, PCI-X, wider buses, lots of PCI Express channels, tremendous amounts of storage with RAID capabilities, ECC [Error-Correcting Code] memory, multiple fans and power supplies. It doesn't need all these things. There is no hard and fast rule. But somebody added more time and expense into this machine, and a professional user is willing to pay a premium because it's of value to them, whereas a gamer wouldn't."

Certainty In Certifications

Certifications are often considered the cornerstone of a workstation's appeal. Most often, a full system undergoes testing by a software designer to guarantee compatibility and reliability. Many professional users won't touch a workstation unless it's certified for their key application(s), even though the costs associated with obtaining certification drive up workstation prices.

While she may not have Gollum's texturing, Luminetik's Alex character relies on capture animation, just like that used in making the movie "The Polar Express," to make her movements lifelike.

A Luminetik designer works on sculpting Ruby using an IBM IntelliStation A Pro workstation.

"Some projects are mission critical, and downtime is not an option," says Ramy Katrib, founder of DigitalFilm Tree (www.digitalfilmtree.com), which has handled movies such as "Cold Mountain" and "Sky Captain," as well as the TV series "Scrubs." "If you have a TV show that turns around every week, it's not like you can go to a show producer and say, 'Our drive went down. Sorry about that.' "

Even though manufacturers are religious about certification, Akiko Ashley, executive producer and partner of Luminetik (www.luminetik.com), takes the opposite view: "When you're making a film, it's not about who says what or whose hardware is certified. It's about getting the job done. We do the workstation and application testing ourselves. We don't want to trust somebody else's certification because there's a lot of marketing dollars that go into that."

When Desktop Worlds Collide

Certification aside, DigitalFilm Tree remains agnostic about its workstations. The company grew up on Macs but now uses whatever is best for the job at hand. Katrib's latest PC-based acquisition for running Autodesk's combustion 4 visual effects software features dual Xeons, 3GB of RAM, and an NVIDIA 6800 Ultra 256MB card. For this application, Katrib didn't feel having a traditional NVIDIA Quadro workstation card was necessary.

Luminetik is in a similar position. To produce a short for the company's upcoming CG motion picture, "Dis_Konnected," Luminetik employed ten IBM APRO IntelliStation dual-Opteron workstations, each with NVIDIA Quadro FX 3000 cards, 4GB of RAM, and Windows XP. Designers used Alias Maya; Alias Motion Builder, Messiah Studio; Adobe Photoshop; NewTek Lightwave 3D; and, to edit and composite, an Apple dual G5 with Final Cut Pro and Shake.

In the '80s, virtually all workstations were proprietary boxes from the likes of SGI (Silicon Graphics, Inc.), Sun, and Steve Jobs' NeXT. As the dual-processor-capable Pentium Pro and then Pentium II Xeon showed, though, Intel had the ability to deliver proprietary performance on a generic platform. By the late '90s, the cost-performance advantages of the PC-derived workstation, as JPR calls it, had become so obvious that all but the highest tier of workstation machines had embraced it. Today even Silicon Graphics, which largely invented the workstation category on proprietary hardware, bases many of its offerings on Intel CPUs, ATI graphics, and Linux.

Expert opinions on when a high-end consumer might need to jump from a desktop to a workstation boil down to this: If you need to visualize 3D content in real time or turn bandwidth-heavy projects around under tight deadlines, you need a workstation. If you have time to render, save your money and stay on a desktop.

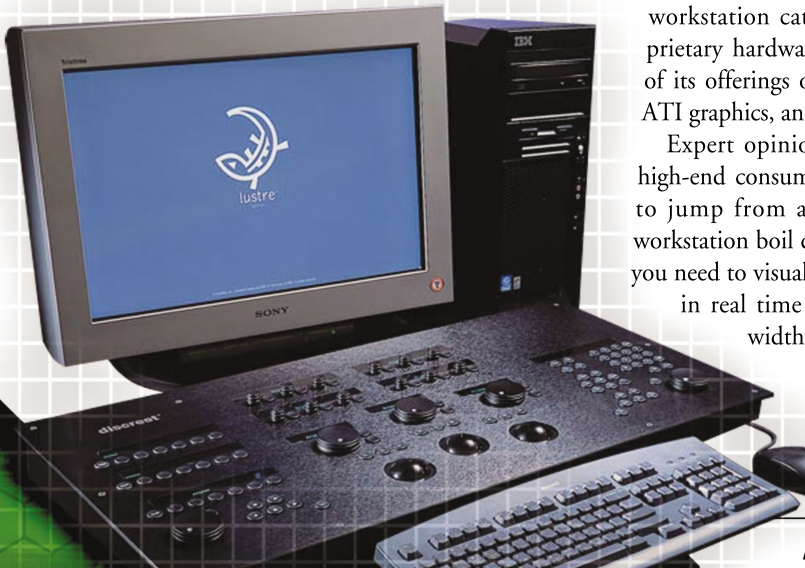
Primary Workstation Components

Workstation configurations can range from a $649 Dell Precision 370, which specs out exactly like a low-end desktop, save for certain certifications, to the SGI Prism visualization system, which can scale from one Itanium 2 CPUs with one ATI FireGL pipe up through 256 CPUs and 16 FireGL pipes with up to 6.1TB of system memory. (Before you put a Prism on your gift list, know that high-end configs start at $200,000.)

When looking for a low-end workstation, keep in mind four key features:

Processor

To discuss low-end workstation processors today is to debate architectures, particularly the frontside bus. The question is whether Intel's multiple Xeon CPU on one FSB is sufficient under heavy loads or whether AMD's Opteron and its triple-HyperTransport bus with crossbar architecture is superior. Apple ditched the single FSB approach of its G4 system and went with dedicated FSB links for its dual-processor G5, noting that in doing so it cleared the bottleneck that kept the Power Mac from achieving workstation-class performance.



Autodesk shows off its discreet lustre, a high-end editing station crafted for handling titles such as "Master and Commander."

Many of the individuals we interviewed for this article lean toward Opteron. Even Sun Microsystems, one of the largest pioneers in workstations, now has an Opteron-based Java Workstation series to complement its SunBlade family based on the UltraSPARC IIIi processor.

"When we're on AMD boxes doing a small render, you can't tell the difference," notes Ashley. "But when we start doing really large renders, like in Maya and Messiah, the Opteron boxes are four to 15 times faster than equivalent Xeon boxes, depending on what we're doing."

AMD is no stranger to trumping Intel in certain recent performance tests. But don't discount Intel just yet. Our findings (see page 69) show that the Xeon can hold its own when it comes to multithreaded applications, and with dual-core chips now arriving, multithread is bound to be a rising trend in many applications. Hyper-Threading also favors Intel when it comes to multitasking. Workstation purists will tell you that the systems are built for hard crunching on a single job, but at the low-end, desktop-style multitasking is still the norm.

Also keep in mind Intel's market penetration. Software developers are more likely to optimize and validate Intel before AMD, and many still believe that in a game of performance leap frog, it may pay to wait for Intel to jump again.

"AMD had 1% of the tier-one OEM workstation market in the fourth quarter of 2004," says Herrera. "And AMD's architecture really shines compared to Intel as you add processors. I'm not saying AMD will seize a significant part of Intel's business here, but if not now, when is it ever going to?"

Memory

Nearly all workstations use some form of ECC memory. Conventional nonparity DRAM can detect errors—the stray flipped bit caused by static, cosmic particles, etc.—but not correct them. ECC memory uses additional circuitry to detect and correct such errors.

In a gaming environment, the worst that a bad memory bit will do is throw up some video distortion that vanishes on the next frame. Only very rarely will a memory fault result in an application or system crash. On a workstation, though, one bad bit could mean the difference between an accurate or inaccurate architectural line draw, and the premium for

THE APPLE FACTOR

Before the Xeon and Opteron became compelling low-end workstation offerings, Apple's Power Mac was (and remains) a popular choice for professionals in audio, video, photography, and document design. Still, according to Todd Benjamin, senior product manager for Power Mac G5, the G5 was the first Apple capable of workstation-class processing.

The G5 generally ships with dual PowerPC 970 processors, currently ranging from 1.8GHz up to 2.5GHz. The 970 chip runs native 64-bit and 32-bit code with no emulation mode. There are two double-precision floating point units in the processor, and each CPU has its own dedicated FSB with bus speeds up to 1.25GHz (although the chips only incorporate 512K of L2 cache). With memory capacities ranging up to 8GB of DDR400, the G5 delivers up to 35.2GBps of memory throughput. Apple supports the latest AGP 8X cards as well as 133MHz PCI-X and SATA but has yet to jump on PCI Express. Overall, the G5 excels at handling very large datasets but is occasionally stunted by its smaller cache sizes vs. competitors on smaller datasets.

One point in Apple's favor is that because it has the rights to create its own drivers for the ATI and NVIDIA cards offered with the system, Apple can and did a unify OpenGL driver architecture for both GPU platforms. Moreover, because the desktop and workstation chips from both companies are more or less identical, Apple can buy Radeon and GeForce cards and effectively turn them into FireGL and Quadro products. Slick. ▲

Still the "un-workstation" of choice for many multimedia professionals, Apple's Power Mac G5 features dual CPUs sitting on independent buses of up to 1.25GHz each, yielding lots of power within the industry's sexiest workstation-class computer.

Brad Alexander, digital animator for JAK Films and "Star Wars: Episode III," creates animatics on a dual-AMD Opteron workstation.

ECC is small compared to potential downtime or work loss.

Note that DDR and DDR2 both have ECC variants, although ECC DDR is much more common.

Graphics

There are four primary graphics vendors in the workstation market: NVIDIA, ATI, 3Dlabs, and Matrox. As on the desktop, ATI and NVIDIA dominate and are engaged in a pitched battle for the low-end workstation market. NVIDIA opened up this arena with the debut of its original Quadro card in November 1999, respinning its original GeForce technology for professionals. ATI, in turn, bought its way into the workstation market by purchasing the shreds of the FireGL company from Diamond/SONICblue in 2001.

"There's a big difference between gaming 3D, which is designed for high frame rates, and to fool the eye into seeing things because you just want it to be fast," says ATI product marketing manager Danny Shapiro. "The accuracy isn't as critical in a shoot-'em-up game vs. designing a gear box for a transmission."

Both companies are roughly divided in supporting AGP 8X and PCI Express interfaces, and both now provide graphics chips for mobile workstations. As we saw above, some companies prefer high-end consumer cards over workstation parts. This is particularly true when outputting to a single monitor and achieving maximum frame rates is the top priority. In many cases, though, a consumer card simply doesn't support the optimized features needed for professional applications. There are three dozen or so feature differences between desktop and workstation cards, including hardware-based support for antialiased lines; 3D stereo output connectors; support for Dual-Link, which powers ultra-high resolution displays such as Apple's famed 30-inch unit; and synchronization of video output with external devices.

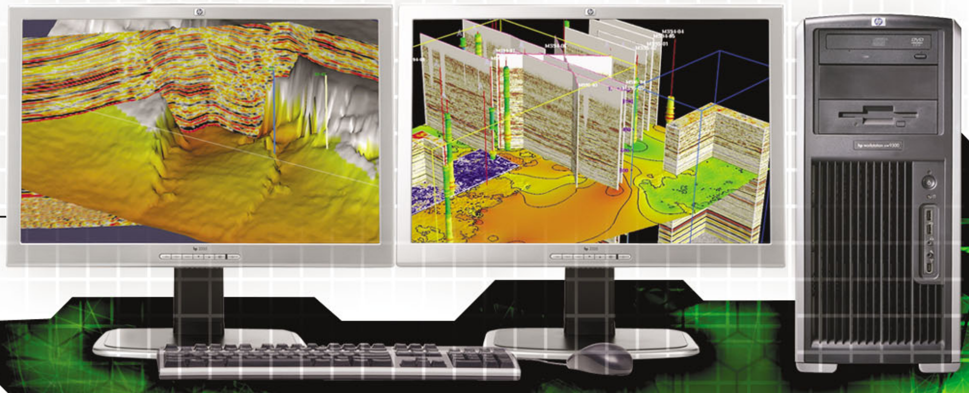
Storage

Drive manufacturers, at least those that make SCSI products, will tell you that workstations need SCSI disks. Those that don't make SCSI products will tell you that Ultra320 SCSI and 3Gbps SATA have practically the same throughput rate, which is why so many businesses are increasingly adopting SATA RAIDs over their spendy SCSI siblings. The SATA argument for workstations is valid, but only up to a point.

Randy Cohen, Maxtor's senior director of firmware and compatibility test engineering says, "It's the bandwidth of the disk drives themselves that determine how quickly you can get information in and out of your storage array, and these bandwidths are quite a bit lower than the physical interconnect. This matters because the SCSI bus is a shared resource. The drives are slower, but you can command drives to do things in parallel. So having a bus transfer rate substantially higher than the disk drives allows you to multiplex the bus and improve the overall performance of the system."

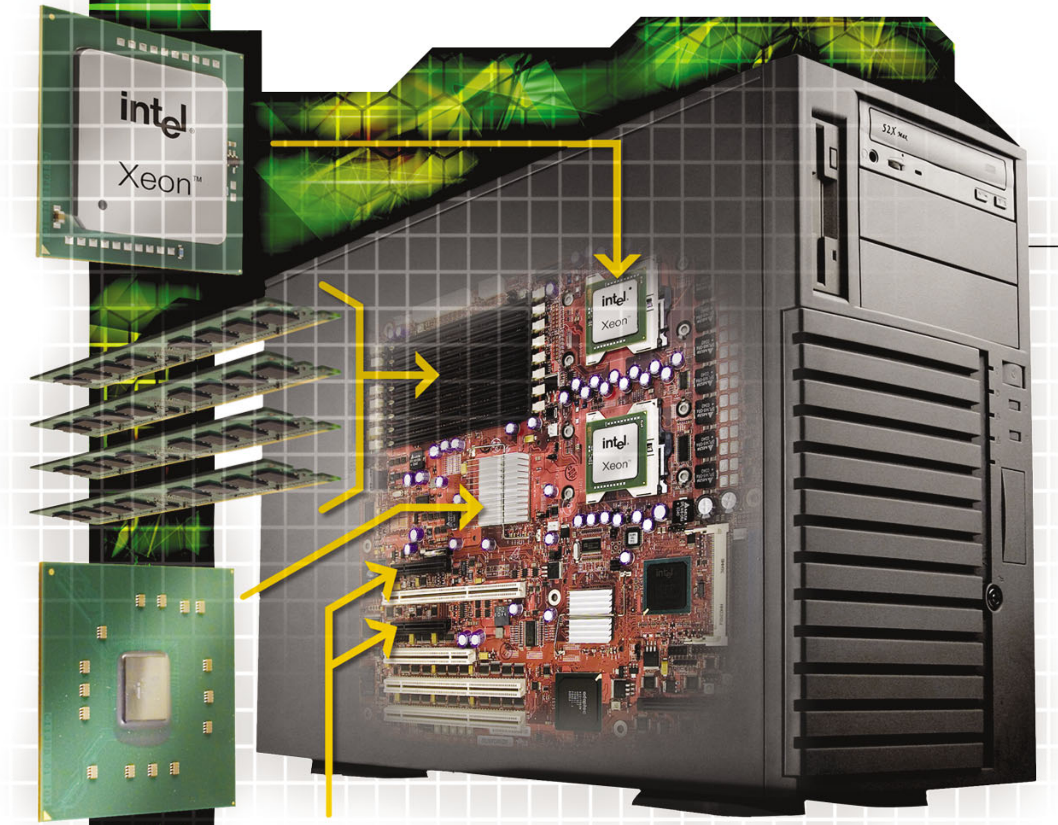
Drive subsystem performance is most discussed in video and visualization applications where real-time editing and/or real-time recording of what is being displayed are paramount. Workstation experts often cite digital video as the top I/O application, but this is often misunderstood by consumers. The miniDV (DV25) footage we all handle with our camcorders is only a roughly 3.1MBps (25Mbps) codec. The rising DV50 codec for high-def doubles this. Now the critical drive spec is not the commonly stated burst rate (mainboard to/from drive cache) but the sustained transfer rate (cache to/from disk surface). Even low-end 5,400rpm PATA drives can achieve 30MBps to 55MBps sustained transfer, which is why you never have bandwidth problems saving home DV to disk.

According to Cohen, though, professionals such as George Lucas are shooting digital video systems needing up to 300MBps, and there are plenty of applications in between. This upper stratum is



Not just for movies, workstations such as this HP xw9300 handle applications ranging from molecular imaging to geological modeling.

Courtesy of Paradigm



Not so different from a regular desktop PC, most workstation configs use dual-CPU motherboards along with more RAM capacity and scaled-up core logic.

where high-end SCSI becomes essential. Seagate's Ultra 320 Cheetah 15K.4 drive, for example, lands sustained transfers (formatted) between 85MBps and 142MBps. A dual-channel Ultra 320 SCSI RAID 0 or RAID 5 can deliver 600MBps or 700MBps transfer rates to cope with such loads.

Ultimately, workstation I/O needs come down to bandwidth. If a pair of MaXLine II SATA/300 drives in a RAID 0 can meet your 75MBps-and-above real-time needs, then you need look no higher.

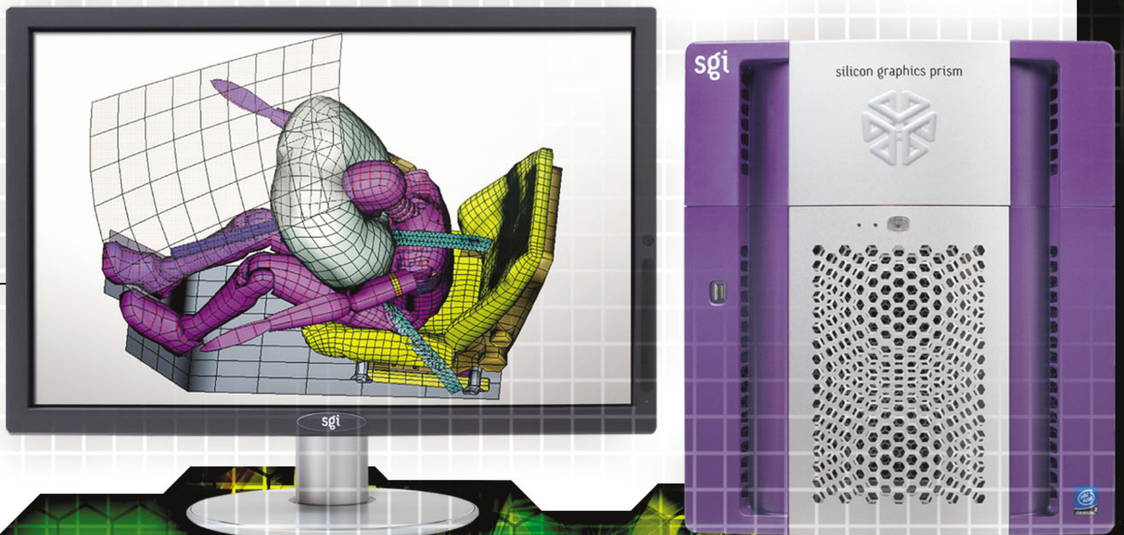
Who Needs A Workstation?

Just as there is no clear definition of a workstation, neither is there a clear line separating consumers from professional workstation users. Common workstation applications cover all types of design, analysis (such as crash test analysis), digital creation of audio/visual and 3D content, compositing, editing, volume modeling (as in oil and natural gas drilling), medical imaging, molecular modeling, and high-resolution projected environments (such as power walls or virtual caves). Some of these applications could fall into a consumer's sphere if he was working to expand an interest beyond the hobby stage and into an income source. As he needs more powerful software, the right apps for the job may require workstations.

Many workstation roads invariably lead to Autodesk, creator of must-have workstation titles such as 3ds max (3D modeling, animation, and rendering) and cleaner (audio mastering and encoding). According to Autodesk, over half of all console games are made using 3ds max. The company's combustion 4 special effects app retails for only $995, well within the range of serious consumers. Would-be music producers will find that cleaner XL for Windows is only $549. Budding architects, engineers, and craftsmen can pick up AutoCAD LT 2005 for $899.

If you've ever had your power system maxed out at 100% when encoding a video, had a large Photoshop effect take 10, 15, or 20 minutes to render, or anything similar that clued you in to the fact that you've outgrown a desktop platform, workstations are there to give you the headroom you need. CPU

by William Van Winkle



Simulated dummies may crash, but workstations generally don't. This entry-level Silicon Graphics Prism box is the opening shot in a product family that scales up to 256 Itanium 2 chips running in parallel.

WORKHORSE WORKSTATIONS | A DIFFERENT KIND OF POWERFUL

Workstation computers are no longer business-only systems. As more users work from home and take up graphics- and processor-hungry hobbies, such as video game creation and digital video editing, high-end builders are beefing up (or creating) their workstation lines. In addition, makers are gearing these beasts toward savvy consumers instead of businesses, which means these systems won't look at all out of place in your home office.

To see what separates the average desktop from its workhorse cousin, we got our hands on five custom workstations. We're familiar with powerful desktops and notebooks, but we were impressed overall with these systems, as they chewed up our benchmarks. All these systems run Windows XP Pro.

How We Tested

Workstations make content rather than play it, so we tossed out some of our usual desktop benchmarks and replaced them with workstation-oriented tests. We chose SPECviewperf 8, which tests OpenGL workstation graphics performance by running portions of popular CAD and content creation apps. We also ran BAPCo's SYSmark 2004, a hulking benchmark that performs such common tasks as building Web sites. Our real-world tests include video encoding and file compression tests. And although workstations certainly aren't gaming systems, we fired up Half-Life 2 and ran our prerecorded demo for fun.

Alienware MJ-12 7550a

Sure, Alienware is best known for its gaming machines, but it also boasts a full line of workstations, including the new MJ-12 7550a. Alienware opted for two 2.61GHz AMD Opteron 252 processors, each with an Ajigo MF043-044A heatsink/fan. The heatsinks have copper bases and aluminum fins, and the units aren't loud. In fact, the entire system is pretty quiet, although not silent.

Eight memory slots line the board just above the processor. Alienware filled four slots with 512MB Corsair DIMMs, making for a solid 2GB of memory and plenty of room for upgrading (up to 8GB). Thanks to the dual x16 slots, you can add a second Quadro FX card when SLI comes to workstation town. For now the system has a 128MB NVIDIA Quadro FX 1400 PCIe, which sits two families below NVIDIA's FX 4000 line. You will probably aspire to a higher-end card (or maybe a second card). We're glad to see a Creative Labs Sound-Blaster Audigy 2 ZS here, as too many custom builders rely on an onboard audio codec.

Rounding out the system are two 160GB 7,200rpm Seagate Barracuda drives. A striped array offers much more storage than systems sporting two 74GB 10,000rpm drives (a popular configuration). We're pleased Alienware prefers space to speed here, but we're surprised it didn't go further. A separate hard drive housing the OS wouldn't have hurt.

The 7550a is the first Alienware workstation to come through our doors with the Professional Workstation Chassis, which is a far cry from its alien-head sibling. The squat, long chassis' front-panel door has a small window that lets you plug devices into two USB 2.0 ports. The door swings open to reveal the intake fan, a media reader, and a 16X NEC ND-3520A. The chassis only has one 5.25-inch bay free. Inside, the 7550a is clutter free; Alienware used cable ties to keep long cords in check and secured the video card and audio cards via two CardKeepers.

The system stumbled a little in our lab, posting 177 in SYSmark 2004. It didn't knock our socks off

MJ-12 7550a
$5,077
Alienware
(800) 254-3692
www.alienware.com

CPU CPU CPU

with SPECviewperf, either, although the scores weren't terrible. The 7550a scored a solid 28.53 in the Unigraphics viewset and 31.55 in the Maya test. It encoded our test video (Dr. DivX) in 14:04 (minutes:seconds), however.

Alienware took a chance by sacrificing a high-end video card and fast hard drives for other components (sound card, large hard drives, etc.) that make this system particularly prosumer-friendly. If you work from home and listen to music while you work (or you work with music), you'll like these choices. Alienware stopped a little short of making this a well-rounded machine, however. The processors are the best that Alienware offers for this system, but the graphics card is just one step up from the bottom option.

Dell Precision M70

Some bigger, badder notebooks around pack enough punch to substitute as a desktop system, and some claim to have the data-crunching, graphics-producing capabilities average workstations offer. Dell's Mobile Workstation family has two members: the M20 and M70. The M20's standard configuration is reasonable, but its 64MB ATI Mobility FireGL isn't as powerful as the M70's 256MB NVIDIA Quadro FX Go1400.

Dell dropped a 2.13GHz Intel Pentium M 770 mobile processor into our M70 and 1GB of DDR2 533 ECC memory. When you're adding memory to a workstation motherboard that has eight slots, you can worry less about buying high-capacity DIMMs. When you're dealing with two slots and a system that has a max capacity of 2GB, however, small DIMMs waste space. We were surprised that Dell chose the two 512MB DIMMs option instead of a single 1GB DIMM option (which adds $250 to the system's cost but leaves the second slot free).

The M70's several hard drive options include a 60GB 7,200rpm drive and an 80GB 5,400rpm option ($30 more). Dell could have added the faster drive for better benchmark scores, so we applaud its decision to go with the slower but higher-capacity drive. The extra 20GB adds a less tangible value. On the wireless end, the notebook sports a Gigabit LAN port and 802.11g Wi-Fi.

The Quadro FX won't shine on a weak display, so Dell outfitted our unit with its highest-end 15.4-inch WUXGA (1,920 x 1,200) LCD. If you often open multiple, side-by-side windows, you'll appreciate the extra wide display, and everyone will like the crisp, clear graphics. A touchpad sits just below the keyboard, and a TrackPoint button sits between the G and H keys. Corresponding mouse buttons rest below the Spacebar. We're glad the notebook has both options. Once you get used to one option, it's a pain to switch to another, especially if you're working under pressure.

We like the M70's chassis; it's sturdy and has Dell's Strike Zone feature, which absorbs some vibrations when the system hits the desk. If you drop your system or put it down too hard, Strike Zone might save your drive. Of course, few sturdy, power-packed notebooks are light; our unit weighed about 7.12 pounds.

The M70 won't win any video-encoding awards with its 12:09 time, but it compressed (WinRAR) our 500MB test folder in a decent 4:47. Its SPECviewperf scores were pretty solid for a $3,584

Precision M70
$3,584
Dell
(800) 915-3355
www.dell.com

CPU CPU CPU C

system, posting 33.12 in Maya and 38.44 in the Pro/Engineer viewset.

If you're looking for a mobile workstation, give the M70 a look. It's not the fastest workstation on the block, but it's a notebook, which means that you can work just about anywhere.

Empro Ultimate
$5,598
Monarch Computer
(800) 611-0875
www.monarchcomputer.com

Monarch Computer Empro Ultimate

Monarch houses its newest, most powerful workstation in a Lian-Li PC-V1200, an unusual chassis that mixes ATX and BTX layouts. The chassis is spacious and has a perforated front panel that lets air flow freely into the case. The chassis also has chrome wheels that keep it off the ground and add some aesthetic flair.

The PC-V1200 flips the motherboard so that it sits near the case's upper-right side. As a result the 550W Enermax EG651P-VE-24P PSU sits at the system's bottom. The PSU has its own compartment, which is next to another that houses the hard drives. The Empro's front panel includes two optical drives, an ASUS 5232AQT and a Plextor PX-716A, and offers two empty 5.25-inch bays. If you need a fifth bay, you can free it up by removing the media reader from the bottom 5.25-inch bay.

Monarch built the system around the new ASUS K8N-DL, ASUS' first dual Opteron board. The K8N-DL has the NVIDIA nForce4 Pro chipset and one PCI-E x1 and two PCI slots, but it only has a single x16 slot. This means you can't upgrade by adding a second video card. Unlike most dual-processor boards, the K8N-DL boasts FireWire, a nice touch. The board also offers 7.1-channel audio. Topping the board off are dual 2.61GHz AMD Opteron 252s and 2GB of DDR400 ECC memory.

The board has six slots, two free and four filled with 512MB DIMMs. Monarch offers the popular Quadro FX 4400, but the company let us take the 256MB ATI FireGL V7100 for a ride. Monarch also tossed four 74GB 10,000rpm WD740GD hard drives into the system, but instead of plugging them into the board's eight onboard SATA ports (via the NVIDIA CK8-04 and Silicon Image SiL3114), Monarch opted for a controller card. Using a 3Ware Escalade 9500S-8 controller card (which has eight ports), the Empro boasts RAID 5. Thus, it offers decent storage space and error correction.

The Empro posted solid scores in SYSmark, including an overall 252. It also provided strong scores in SPECviewperf's viewsets: 36.74 in 3ds Max, 32.72 in EnSight, and 50.61 in Pro/Engineer. Despite scoring an unimpressive 5331 in PCMark04's hard drive test, it wrangled an overall 7430 from the benchmark.

The Empro is an extremely powerful rig that rocked our other benchmarks and real-world tests. The four-drive RAID 5 configuration is a great choice for users who want speed and stability but don't want to sacrifice much storage space and aren't interested in SLI.

Polywell PolyStation 7525SLI

Right out of the box, Polywell's PolyStation7525SLI falls a little short of its name due to its lone NVIDIA QuadroFX 4400. NVIDIA tells us it will probably release drivers that support Quadro SLI before you read this, but as we went to press, workstations still use one card. That said, the 512MB workstation card is no slouch and can hold its own until the reinforcement arrives. Weirdly enough, Polywell chose a 460W Fortron PSU. NVIDIA's David Higham says that dual-Quadro systems will require PSUs in the 650W to 750W range.

Polywell mixed fast with fast by dropping a striped array of 10,000rpm hard drives into the top drive cage, but it didn't follow through with storage, the other half of a good hard drive package.

PolyStation 7525SLI
$5,665
Polywell
(800) 999-1278
www.polywell.com

The two 74GB drives offer more than enough to handle an array of programs but not enough to store a bunch of video-editing projects and finished products. The drive shortage isn't a problem by itself, but the motherboard doesn't have any extra SATA ports, which means you'll need to buy an add-on card if you want to add more SATA drives. Home offices that have servers are fewer than those that don't, so we're disappointed the system doesn't have more hard drives or at least better upgradeability in this area.

Home-office gurus would probably prefer the souped-up version of the motherboard. The Poly 7525SLI PCIe is a Supermicro Super X6DAI-G, a streamlined version of the Super X6DAT-G. The latter offers four more SATA ports than the former, thanks to a Marvell controller near the southbridge. Polywell doesn't offer the X6DAT-G as an option. The system's board houses two 3.6GHz Intel Xeons and 2GB of ECC memory, which fill four of the board's eight slots.

Don't plan on adding a media reader unless you're willing to use the PolyStation's remaining 5.25-inch bay. The system has a floppy drive, but you can't swap it with a reader because of the floppy-only external 3.5-inch bay. The other 5.25-inch bays house a 16X Sony DW-D22A DVD+RW (2.4X DL) and a 52X Sony CRX320E CD-RW, which ought to cover your burning needs. The CD-RW seems overkill, though, as it offers CD burn and read speeds the DW-22A can't match. (The DW-D22A offers 48X.)

Of these systems the PolyStation most closely resembles an office workstation. The front panel sports several status lights and two USB 2.0 ports, but it doesn't offer FireWire ports. (Neither does the mobo.) And watch out for the PolyStation's two large, plastic feet, which might scratch up vulnerable surfaces. The chassis is spacious, supporting up to eight hard drives, but Polywell didn't hide the cables. The interior certainly isn't messy, however.

Polywell's beast performed well in our tests, posting an impressive 266 in SYSmark 2004, encoding Dr.DivX in 8:18, and offering solid SPECviewperf numbers. We were a little surprised to see it break five minutes when compressing our 500MB test folder, but 5:15 isn't unreasonable.

The PolyStation is a workhorse, but it isn't upgrade-ready out of the box. If you don't mind swapping out the PSU and adding a SATA controller card, you'll get along fine with this rig, but that's a big "if."

Voodoo PC Doll d:210a

If you are a SFF fan, you've probably already seen Voodoo's Doll family, which until recently housed gamer and home-use systems. Those Dolls haven't left the playground, but the d:210a adds a workstation to the family. At 8.75 inches high x 8.25 inches wide x 13.75 inches deep (about a shoebox and a half), this is the smallest dual-processor workstation we've reviewed.

Unlike other Dolls the d:210a's front panel has four USB 2.0 ports, media reader, FireWire port, and mic/headset ports. Voodoo swung our review unit's media reader by running a USB cable from one of the motherboard's external USB ports through the system to the front. However, it plans to connect the media reader to the motherboard when it sends the system to customers, so all four back USB 2.0 ports will be free. A fin on top of the system covers the d:210a's Wi-Fi antenna.

Speaking of the chassis' back end, you'll find the 300W power supply does not quite fit inside the system. The chassis has special attachments that leave about a quarter of the PSU hanging out the back. (Watch out; it gets extremely hot.) The exposed PSU isn't surprising: The system has a boatload of space-hogging, high-end components, including dual 2.2GHz Opteron 248s, 2GB of memory, and two 74GB 10,000rpm drives (RAID 0). The d:210a also boasts a 256MB eVGA Quadro FX 4000 (AGP) video card.

Even in this small case, Voodoo works its cabling magic. It twisted, folded, and tied the system's cabling, which snakes around the massive copper CPU heatsinks. All but one cable fits the system perfectly. Voodoo plugged a standard SATA cable into one hard drive and a cable with an L-shaped tip into the other. The L-shaped cable doesn't touch the side panel, but the panel presses against the standard tip.

Of course, Voodoo had to make sacrifices to cram all this into the little case. The victim is expandability. The two 1GB DIMMs fill the mobo's only two slots; the two hard drives fill the drive cage; and the Pioneer DVR-109 fills the system's only 5.25-inch bay. The eVGA card doesn't block the lone PCI slot, but any PCI card will likely disrupt the video card fan's airflow. Given the lack of expandability, we're a little surprised Voodoo chose such small (albeit speedy) hard drives.

The d:210a scored 225 in SYSmark 2004 and posted strong SPECviewperf scores, including a 47.99 in the Maya viewset. We can't complain about its 4:23 500MB compression, but we were surprised that it encoded our test video in 12:09.

Our biggest beef with the d:210a is something you can fix if you configure your own rig: small hard drives. Other systems that have dual 74GB drives also support additional drives. A user who plans to lug the system to and fro might prefer space over speed. If so, you can configure your system with drives as large as 400GB at 7,200rpm. Overall, this is a powerful, portable rig.

by Joshua Gulick

Doll d:210a
$6,747.44
Voodoo PC
(888) 708-6636
www.voodoopc.com

THE MAKEUP OF A WORKSTATION

Although all the builders in this roundup focused on muscle, each offered a unique perspective on what makes a workstation. Voodoo and Dell chose portable systems; Alienware mixed power with storage and quality sound; and Monarch and Polywell duked it out for sheer muscle. For more benchmarks subscribers can go to www.cpumag.com/cpujun06/workbenches.

	Alienware MJ-12 7550a	Dell Precision M70	Monarch Computer Empro Ultimate Workstation	Pollywell PolyStation 7525SLI	Voodoo PC Doll d:210a
CPU	2.61GHz AMD Opteron 252 (x2)	2.13GHz Intel Pentium M 770	2.61GHz AMD Opteron 252 (x2)	3.6GHz Intel Xeon 2MB cache (x2)	2.2GHz AMD Opteron 248 (x2)
Motherboard	Tyan Thunder K8WE (2895)	Dell	ASUS K8N-DL	Poly 7525SLI PCIe	IWILL ZMAX-DP
Chipset	NVIDIA nForce4 Pro	Intel 915PM	NVIDIA nForce4 Pro	Intel 7525	NVIDIA nForce3 Pro
RAM	2GB Corsair DDR400 (512MB x4)	1GB DDR2 533 Hynix ECC (512MB x2)	2GB DDR400 ECC Corsair TwinX1024RE-3200LL (512MB x4)	2GB DDR333 Wintec ECC (512MB x4)	2GB Crucial ECC (1GB x2)
Hard Drive	160GB 7,200rpm Seagate Barracuda (x2; RAID 0)	80GB Toshiba MK8026GAX 5,400rpm	74GB Western Digital Raptor WD740GD 10,000rpm (x4; RAID 5)	74GB Western Digital Raptor WD740GD 10,000rpm (x2; RAID 0)	74GB Western Digital Raptor WD740GD 10,000rpm (x2; RAID 0)
Graphics	128MB PNY NVIDIA Quadro FX 1400 PCIe	256MB NVIDIA Quadro FX Go1400	256MB ATI FireGL V7100 PCIe	512MB PNY NVIDIA Quadro FX 4400 PCIe	256MB eVGA GeForce NVIDIA Quadro FX 4000
NIC	Integrated Gigabit LAN NetXtreme, Intel PRO/ Wireless 2200 WLAN 802.11g	Gigabit Broadcom	Integrated Gigabit LAN	Integrated Gigabit LAN	Integrated Gigabit LAN, 802.11g
Optical Drive	NEC ND-3520A 16X/6X/16X DVD+RW, 4X DL DVD+R, 48X/24X/48X CD-RW	NEC ND-6500A 8X/ 4X/8X DVD+RW, 2.4X DL DVD+R, 24X/ 16X/24X CD-RW	ASUS CRW-5232AS 52X/32X/52X CD-RW	Sony CRX320E 52X/ 32X/52X CD-RW, 16X DVD	Pioneer DVR-109 16X/6X/16X DVD+RW, 6X DL DVD+R, 40X/ 24X/40X CD-RW
Optical Drive	N/A	N/A	Plextor PX-716A/SW 16X/4X/16X DVD+RW, 4XDL DVD+R, 48X/24X/ 48X CD-RW	Sony DW-D22A 16X/4X/16X DVD+RW, 2.4X DL DVD+R, 48X/ 24X/48X CD-RW	N/A
PSU	660W Enermax EG851AX-VH(W)	Dell unit	550W Enermax EG651-VE-24P	460W Fortron FSP460-60	350W TeamGreat Technology T43B014
Cooling	Ajigo MF043-044A (x2)	Dell Remote Heat Exchanger	Thermaltake A1838 (x2)	Stock Xeon heatsink/fan (x2)	Voodoo Aggressor Hybrid WaterPipe Heatsink Cooler
Chassis	Professional Workstation	Dell Mobile Workstation	Lian-Li PC-V1200	Workstation tower chassis	Voodoo Doll (IWILL ZMAX-DP)
OS	WinXP Pro	WinXP Pro	WinXP Pro	WinXP Pro	WinXP Pro
Pros	Speedy processors, large hard drives, Creative Labs sound card	Ultra portable, crisp display	Lightning-fast system, roomy chassis, lots of storage, plenty of upgrade options	Plenty of speed, powerful graphics card	Can carry this dual-processor rig in a duffel
Cons	Lacks heavy-duty graphics power, little slow to compress and encode our test files	Not as powerful as high-end workstations, comparatively low hard drive space	No SLI, have to replace the mobo to reach your dual-card dreams	PSU won't support an SLI upgrade, only two SATA connectors	Can't add components
Benchmarks					
Dr. DivX (845MB VOB, 1,000Kbps, One pass)	14:04	12:09	8:45	8:18	10:16
WinRAR (500MB folder)	7:20	4:47	4:13	5:15	4:23
SYSmark 2004 (Overall Score)	**177**	**157**	**252**	**266**	**225**
Internet Content Creation (Overall)	240	186	303	338	289
Office Productivity (Overall)	131	132	210	210	175
SPECviewperf 8					
3ds Max	21.87	23.54	36.74	30.4	33.13
CATIA	17.65	16.78	26.18	28.63	25.57
EnSight	13.65	18.52	32.72	25.52	20.61
Lightscape	17.14	16	23.22	25.67	22.6
Maya	31.55	33.12	48.61	42.47	47.99
Pro/Engineer	31.35	38.44	50.61	38.24	37.21
SolidWorks	17.02	19.82	24.69	25.85	21.02
Unigraphics	24.06	24.74	26.75	28.53	28.27
Half-Life 2					
1,600 x 1,200 (High 4XAA 8XAF)	18.89fps	21.38fps	59.62fps	49.86fps	43.39fps

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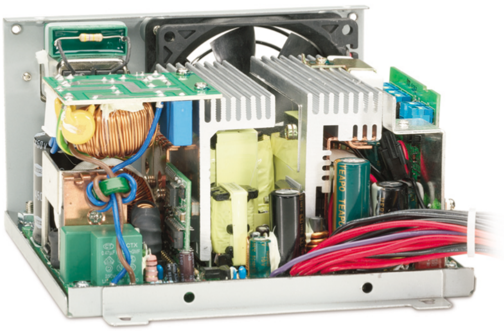

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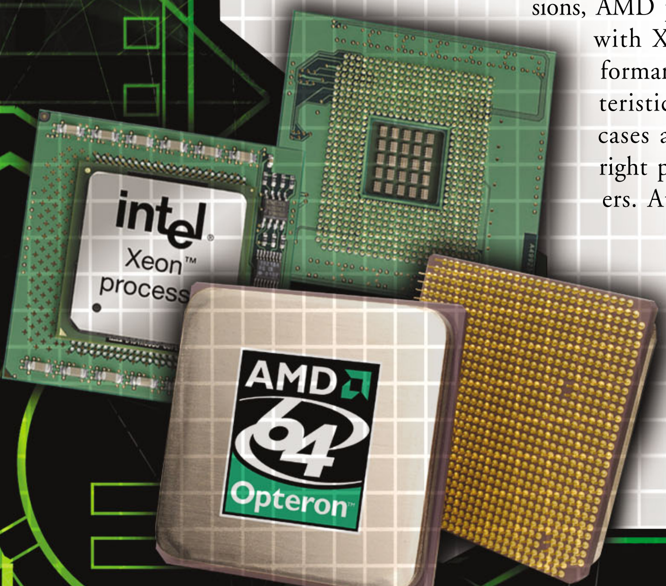
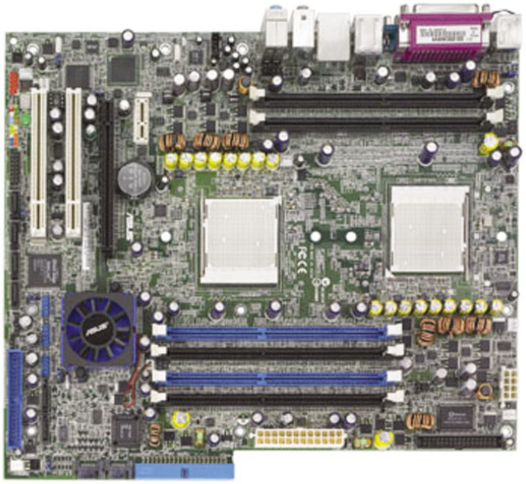
OPTERON VS. XEON | THE WORKSTATION JUGGERNAUTS DO BATTLE

Flash back to 1998 when Intel's Pentium II Xeon had just emerged on the scene, fusing the advantages of the Pentium II with the Pentium Pro, Intel's previous workstation flagship. AMD was still little more than an annoyance to Intel at that point, selling its K6 architecture as an alternative desktop solution. Although AMD stood up well against Intel's mainstream line, there simply wasn't any competition when it came to high-end workstations and servers.

It goes without saying that times have certainly changed. AMD's Athlon surfaced in 1999, immediately scoring fans amongst the gaming community and driving Intel's once-astronomical prices down. Athlon XP followed, earning AMD further accolades. But despite continued success on the desktop, AMD trudged on without an enterprise-worthy contender. Sure, it let loose with the Athlon MP dual-processor architecture, but that design never really convinced IT managers they should stray from Intel's established infrastructure. Besides, Xeon was already a full NetBurst-based core, similar to the Pentium 4, delivering high clock speeds and copious bandwidth. At the time those were the features that sold processors.

Then, in 2003, Opteron hit store shelves, going on to thoroughly impress journalists and early adopters alike. By combining components of the preceding K7 core, an integrated memory controller, and 64-bit software extensions, AMD pulled even with Xeon's performance characteristics in many cases and zipped right past in others. At last there were two workstation candidates worth pitting against each other.





The ASUS K8N-DL is a great platform on which to build an entry-level workstation.

A Broadside Exchange

Epic battles are the subject of celebrated lore. From sports events to Wild West shootouts to battleship showdowns, there's nothing quite like two titans going toe to toe. After a relatively uncontested run at the top, Intel had finally met the Monitor to its Merrimac in AMD's Opteron. It seemed such a capable competitor took Intel by surprise. Without even touching performance in a 64-bit environment (operating system support wasn't quite there yet), Opteron laid down impressive 32-bit numbers that reflected a large on-die cache, low-latency memory accesses, and rapid inter-chip communications enabled through HyperTransport.

Although perhaps caught off guard, Intel wasted little time in preparing a comeback. Its 90nm manufacturing process was nearly ready for desktop retail consumption (finally realized in the Q1 2004), and Intel expected higher clock frequencies, lower power consumption, and enough flexibility to add such features as L2 cache. As it turned out, 90nm was certainly able to help bolster operating speed, but it didn't do much for the architecture's mounting power and thermal limitations. Fortunately, new features were added. Prescott, the desktop variant of Intel's new architecture, emerged with 1MB of L2, a 16KB L1 data cache, and SSE3 instruction support. The stage was officially set for Xeon to strike back.

AMD's Opteron Dissected

The naming scheme assigned to AMD's Opteron is somewhat arbitrary, yet it's easy enough to follow. All Opterons feature 1MB of L2 cache and populate a 940-pin socket. Where each model differs is in clock frequency. An Opteron x40 (where x represents the number 1, 2, or 8) runs at 1.4GHz. The x42 bumps that number up to 1.6GHz, and so on, up to the x52 models running at 2.6GHz.

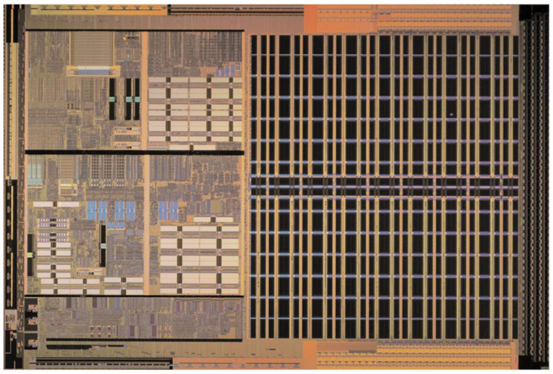
Beyond core speed, Opteron processors are also divided into three families according to their multiprocessing capabilities. Workstations with just one chip tap the 100 series. Dual-processor setups require models in the 200 series. AMD's 800 series is reserved for four- and eight-way servers. As you ascend the hierarchy, price increases accordingly.

Despite their multiprocessing differences, every Opteron features three HyperTransport links with which to communicate. On a single-processor platform, all three links may be used to attach core logic devices, such as PCI-X or PCI Express tunnels. A DP configuration leverages one link for inter-processor connectivity, while the other two support I/O devices. Some of the most intricate motherboards feature multiple chipset components attached to different processors through HyperTransport, enabling innovative features, such as dual x16 PCI-E ports with SLI support on Tyan's K8WE.

As mentioned, Opteron processors also boast an integrated memory controller operating at the host frequency. Because it's part of the silicon die, the controller isn't easily upgraded and as such still tops out with two, 64-bit channels of DDR400 memory. AMD claims that Opteron runs best using older DDR memory modules anyway, due to their timing advantages.

The culmination of AMD's subsequent revisions, advances in manufacturing, and progressive speed improvements is the Opteron 252. Running at 2.6GHz on a new 90nm lithography process, the 252 is a revision E chip. The 252 wields SSE3 support and an improved memory controller. A 1.4V-core voltage reduces the its power consumption, easing thermal constraints, too. Just bear in mind that recognizing a revision E Opteron requires an updated motherboard BIOS.

For Opteron processors manufactured after May 2004, a BIOS update will also enable PowerNow! technology, says Pat Patla, AMD's director of server and workstation marketing. In large server clusters, the addition means reduced air conditioning costs. Workstations are more likely to run cooler and quieter thanks to clock throttling capabilities switched on by the PowerNow! feature.



Even the single-core Opteron is a complex beast, with 1MB of L2 and 128KB of L1 cache.

Intel's Xeon Analyzed

Intel's dual-processor contender, the Xeon DP, was ill-prepared to face off against Opteron back in 2003. No time was wasted in improving the workstation chip, though. Cache was doubled from 512KB to 1MB. Frontside bus speeds were accelerated from 400 to 533MHz, and core frequencies broke the 3GHz barrier. But that still wasn't quite enough to topple Opteron.

Finally, early in 2004, Intel presented the "Nocona" core. Heavily laden with new functionality, Intel had an answer to AMD's challenge from a year prior. Recognizing that AMD's point-to-point topology and integrated memory controller gave Opteron an I/O advantage, Intel made a special effort to again augment bus frequency, this time to 800MHz. A larger L1 data cache further improved the processor's responsiveness. For a time the addition of SSE3 distinguished Xeon's multimedia alacrity, though AMD implemented the feature into its own products a year later.

The other notable architectural improvement was DBS (Demand-Based Switching), which is basically Enhanced Intel SpeedStep Technology for the enterprise. DBS

BUILD VS. BUY

The decision to build or buy is difficult enough when it involves a gaming PC. Workstations can get even trickier. Sure, there's money to save by doing it all yourself. But do you already know what hardware best suits your needs? Engineering-design software is heavily CPU dependant, while content creation and MCAD (mechanical computer-aided design) apps often emphasize graphics performance. Wouldn't it just be better to let the professionals handle the configuration side of things?

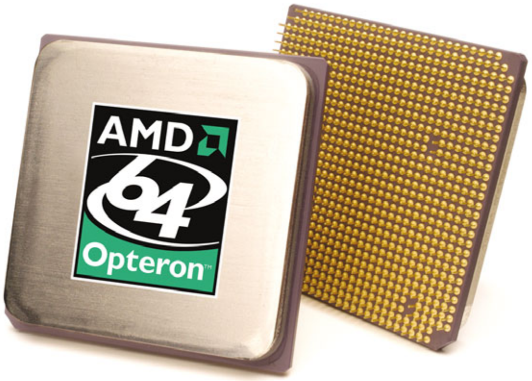
We priced out a top-tier workstation from HP and pit it against a homebrewed kit to see which one offered more value. The HP xw6200, equipped with two Xeon 3.2GHz 1MB processors, Windows XP Pro, an NVIDIA Quadro FX 3400, 2GB of registered DDR400 memory, a pair of 160GB hard drives, and a 16X DVD writer came out to $4,151, excluding the price of a display.

The same setup with two retail Xeon chips, an ASUS NCT-D "Tumwater" motherboard, 2GB of Kingston memory, the same Quadro card, Seagate hard drives, Plextor's PX-716A, an EPS12V power supply, and a $200 workstation chassis cost just $3,200, including Windows XP. So long as you're comfortable putting the pieces together, building your own workstation is an easy way to save a cool grand vs. a prebuilt configuration. ▲

throttled back voltage and clock speed to conserve energy. More importantly, it represented a power-saving feature that AMD didn't offer with Opteron.

Another of AMD's weaknesses was platform support. Workstation systems notoriously wield powerful graphics cards and robust disk I/O subsystems. Intel's PCI Express initiative signified a major step forward in this area by accelerating those critical data pathways. The "Tumwater" chipset emerged alongside Nocona, enabling significant bandwidth increases beyond what PCI-X or AGP could previously handle. Unfortunately, backward compatibility with those standards wasn't possible. Graphics card manufacturers led the way in adopting PCI-E, and Intel now expects that more than 50 PCI-E devices will be available by the end of this year. As you would expect, exclusive support for such a pervasive technology lent considerable credence to Intel's direction.

Intel didn't stop there, however. The latest iteration of its Xeon DP processor centers on the Irwindale core, which in many



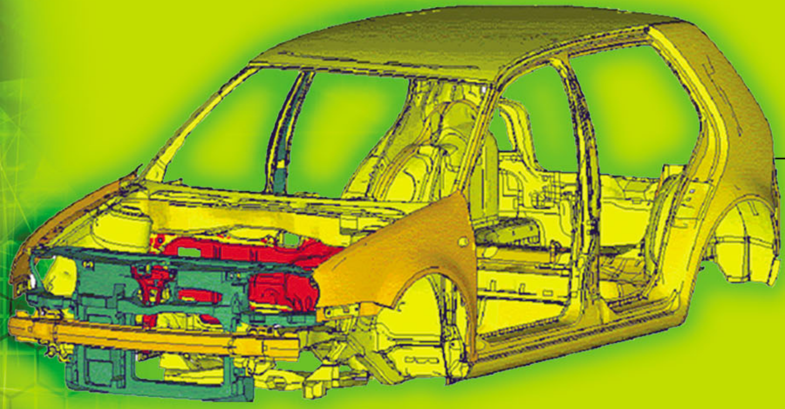
When Opteron debuted in a 940-pin interface, it wasn't clear how long the design would last. Dual-core 940-pin chips are now extending the Operton's life.

WORKSTATION APPLICATIONS

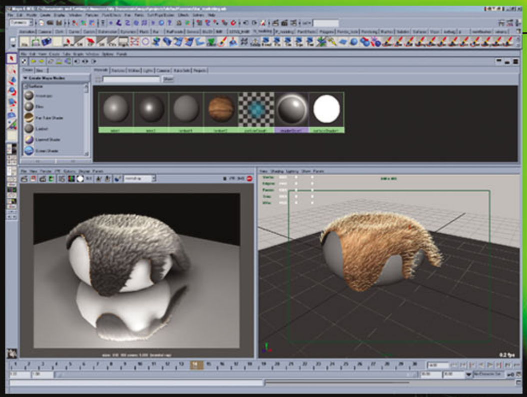
The differences between workstations and desktop PCs are often subtle, especially for power users who regularly run demanding applications at home. However, a handful of software applications characterize the heavy usage typical of the workstation environment.

Among the titles you'll likely find on a multiprocessor (or multicore) workstation, AMD cites computer-aided engineering tools such as MSC Software's Nastran, Fluent's computational fluid dynamics software, and ANSYS' applications. Digital content creation solutions, such as Maya, SoftImage XSI, and 3D Studio Max, are also quite taxing. Electronic design automation is a focus of attention, too, as are scientific applications driven by the medical and energy industries.

Fancy software isn't requisite for workstation qualifications, though. Even Microsoft's Windows Media Encoder 9, a free download, stands to benefit from high-caliber hardware. The same goes for iTunes and DVDShrink, both popular mainstream programs that really take off when you bring out the big guns. ▲



You might need a workstation if you use computer-aided engineering tools, such as MSC Software's Nastran.



Things are getting "hairy" here with Maya at work.

No, that's not an in-game screenshot. It's a development photo from the artists at DICE who use Maya to render car models in the Rallisport games.

ways is similar to the Pentium 4 600-series of processors with 2MB of L2 cache. Irwindale is an interim solution while the dual-core Xeon is polished, and the processor benefits from an 800MHz frontside bus, 64-bit capabilities, NX-bit support, DBS, and the same beefy E7525 platform introduced previously. The fastest model operates at 3.6GHz. The processor is great competition for AMD's Opteron 252.

AMD Emphasizes Dual-Core Workstations

Both AMD and Intel have had dual-core processor technology on their radars for a while now. Intel planned to assault the desktop market first with its Pentium D, which has already made a debut in limited press sampling. AMD, hoping to duplicate Opteron's initial success, chose to focus on the server and workstation dual-core variant, leaving mainstream desktops for the last half of 2005.

AMD's approach seems to make the most sense. Much of the software written for workstations and servers is already multithreaded, meaning that upper echelon of content designers, administrators, and programmers stand to benefit from dual-core technology immediately. AMD's cause is further strengthened by platform support. Dual-core Opteron and Athlon 64 processors are fully socket-compatible with existing Socket 940 and Socket 939 configurations. So long as the motherboard can support existing 90nm Opteron processors, a BIOS update guarantees that the new chip will be properly recognized and utilized.

Although you can buy an Opteron through the channel for less money, AMD's boxed product gives you a retail heatsink, too.

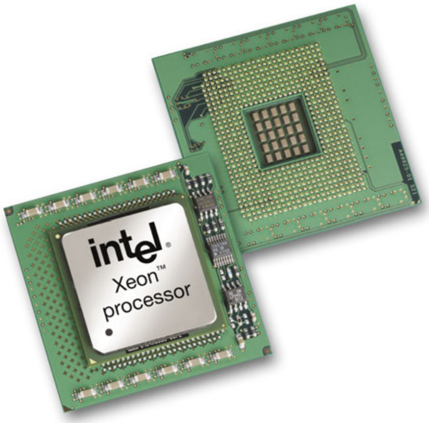
How did AMD manage such a smooth transition? According to Patla, the architecture was conceptualized in 1999 with dual-core in mind. In essence, the pieces have always been there. However, AMD's Damon Muzny says that only now as AMD completes its shift to 90nm manufacturing is a single die with two cores reasonable to produce.

The dual-core Opteron architecture mates two processing cores, each featuring 64KB of instruction cache, 64KB of data cache, and 1MB of L2 cache, with a system request queue and crossbar. The crossbar interfaces with three HyperTransport links that deliver 32Gbps of bandwidth each, along with an integrated memory controller supporting two channels of DDR400 RAM. Although both cores are forced to share the available memory, AMD claims less than a 10% performance reduction. The HyperTransport links are also shared, but thanks to a recent bump to 1GHz, there's plenty of bandwidth to satiate both cores.

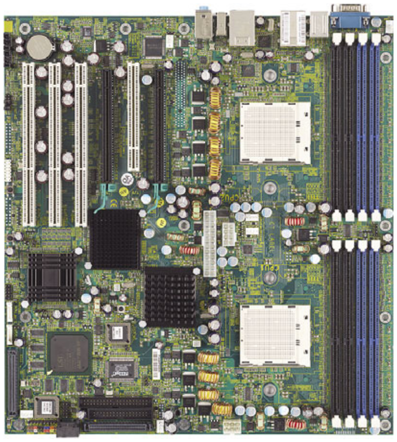
Intel: Us, Too!

With more than 10 multicore projects spanning the desktop, server, and mobile markets, Intel is being forced to prioritize. For now that means dual-core workstations will have to wait until Q1 2006. It's not all bad news, though. Intel's first dual-core Xeon (Dempsey) will center on an upcoming 65nm manufacturing process, suggesting faster clock speeds and diminished power-consumption requirements.

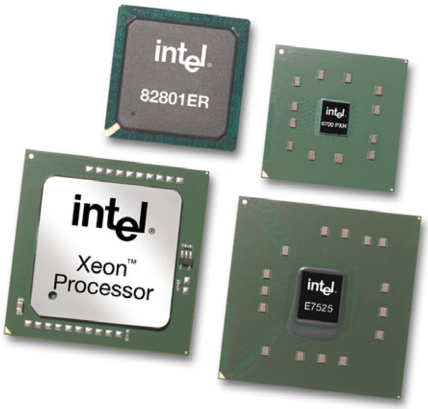
There will also be architectural improvements that may give Intel a leg up on AMD, including I/O Acceleration Technology, Virtualization Technology, and Active Management Technology. The combined effect of those new features, according to Intel, will be up to 30% more network I/O, hardware accelerated RAID functionality, the ability to run multiple OSes in independent



Intel's Xeon DP is architecturally similar to the Pentium 4, but it utilizes a completely different interface designed with multiprocessing in mind.



Another powerful workstation board, the Tyan K8WE is SLI capable, sports dual Gigabit Ethernet, and comes with optional Ultra320 SCSI.



"Tumwater" is the premier workstation chipset for the Xeon DP, enabling PCI Express connectivity, DDR2 memory, and support for an 800MHz bus.

partitions, and remote troubleshooting capabilities, which is a boon to SMBs and enterprise customers.

Whereas AMD will quickly remind you that dual-core Opteron fits in today's platform infrastructure, Xeon doesn't enjoy the same luxury. For the value-conscious, such a situation is understandably frustrating, especially if you recently acquired a single-core workstation. On the flip side, however, a fresh chipset means improved features and, hopefully, increased performance. A 1,066MHz FSB is said to be on tap, as is a new Gigabit Ethernet physical layer and ESB2 enterprise-level southbridge. Those features, together with Intel's improved processor architecture, will undoubtedly heat things up.

Even more compelling than the performance characteristics boasted by upcoming dual-core workstation processors is the true value that they'll enable in environments that are sensitive to threaded software. Tally up the costs of a dual-processor workstation today. Start with the requisite motherboard, add a pair of CPUs, factor in the memory necessary to keep both chips populated with 128-bit buses, and consider the other high-end components. With dual-core you start with a single-socket motherboard, which immediately shaves hundreds of dollars off the price. When you factor in the processor price, a single dual-core system enables much better threaded performance for significantly less than a traditional DP setup.

WHAT DOES SLI MEAN TO WORKSTATIONS?

If you drool at the thought of dual-core processors, multiple graphics cards likely whet your whistle, too. Previously, cooperative-rendering workstations involved proprietary equipment, including expensive hardware and comparably priced software support. Quantum3D and Evans & Sutherland are two recognizable names in that high-end graphics market.

However, the development of SLI technology makes powerful workstations more accessible by multiplying graphics performance. NVIDIA claims that MCAD (mechanical computer-aided design), DCC (digital content creation), and nonlinear video-editing applications will all run faster on workstations outfitted with an nForce Professional chipset and a pair of compatible Quadro FX graphics cards.

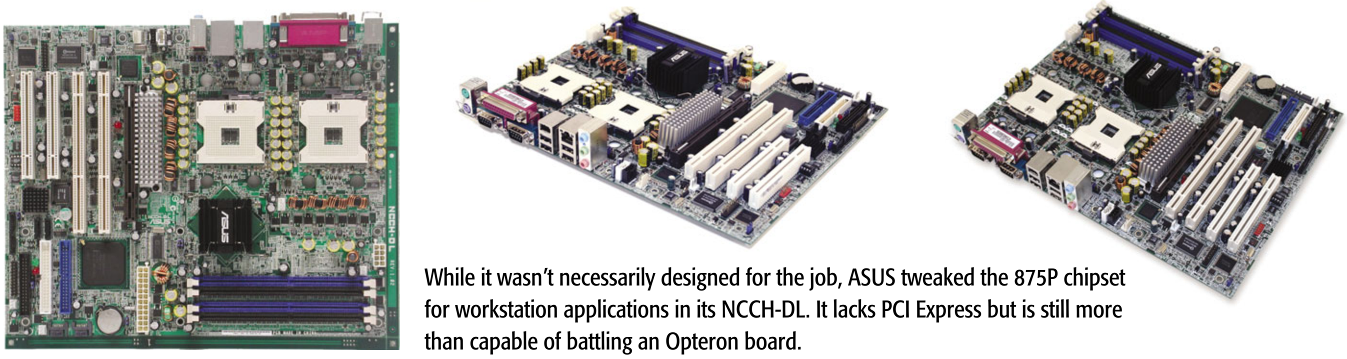
The clear caveat is that NVIDIA is now in the position to support SLI and cultivate its benefits. Performance gains aren't automatic. Rather, SLI functions as advertised only after software drivers have been optimized on a per-application basis. The current list of compatible programs is laden with games but doesn't name a single professional title. SLI has the potential to make a major impact on workstation graphics, but we're not quite there yet. ▲

With a motherboard, such as Tyan's K8WE, and a pair of Quadro graphics cards, you can add SLI to a workstation, multiplying graphics performance.

A Secret Weapon Springs Forth

Given Intel's buzz about dual-core workstations later in 2005, you would think the technology was still some way off. In actuality, AMD is already manufacturing its dual-core Opteron in 100, 200, and 800 series trims. The incredibly complex chip consists of 205 million transistors on a 90nm process. As such it's still a bit limited in how fast it operates; the flagship Opteron 875 cruises at 2.2GHz, as do the 275 and 175 models.

Clearly, AMD's dual-core nomenclature deviates somewhat from established convention. It's still easy enough to decipher, though, with successive models emerging in multiples of five, each representing a 200MHz jump. According to AMD the new Opteron processors will initially carve



While it wasn't necessarily designed for the job, ASUS tweaked the 875P chipset for workstation applications in its NCCH-DL. It lacks PCI Express but is still more than capable of battling an Opteron board.

out higher price points and over time fall to the levels of single-core chips.

But that does no't mean single-core CPUs will disappear any time soon. In fact, AMD recommends that workstations primarily tasked with nonthreaded applications stick with single-core Opteron or Athlon 64 FX chips, which run at higher frequencies and, in turn, yield better performance than today's dual-core products.

In Retrospect

Now that AMD and Intel are competing more aggressively in the workstation market, expect to see innovation transpire at a dizzying pace. Already AMD has motivated Intel to adopt 64-bit computing, while Intel's DBS pressured AMD to add PowerNow! to the Opteron. Both processing architectures populate powerful platforms, with PCI-E and massive memory support. Without question, the next step is dual-core.

AMD has already laid its dual-core plans on the table, along with retail product. Intel's response is nearing completion. The two companies are taking somewhat different approaches, yet they'll both forever impact the workstation market by improving value and ratcheting performance.

For the time being, the epic battle between Opteron and Xeon wages on without a decisive victor. AMD clearly leads in a majority of our benchmarks, but Intel's efforts to pull even are clear. No matter which way you slice it, power users will realize the most benefit as processor, graphics, and storage manufacturers one-up each other in the workstation marketplace. CPU

by Chris Angelini

WORKSTATIONS PUT TO THE TEST

Anxious to determine which processor delivers optimal performance, we assembled three workstation configurations representing the very best from Intel and AMD.

The first setup was armed with a pair of Opteron 252 processors running at 2.6GHz. ASUS' K8N-DL served as the test platform, centering on NVIDIA's nForce Professional 2200 chipset. The board's single PCI Express x16 slot was populated with a GeForce 6800 Ultra graphics card, and we used 2GB of Corsair's best registered DDR400 low-latency memory.

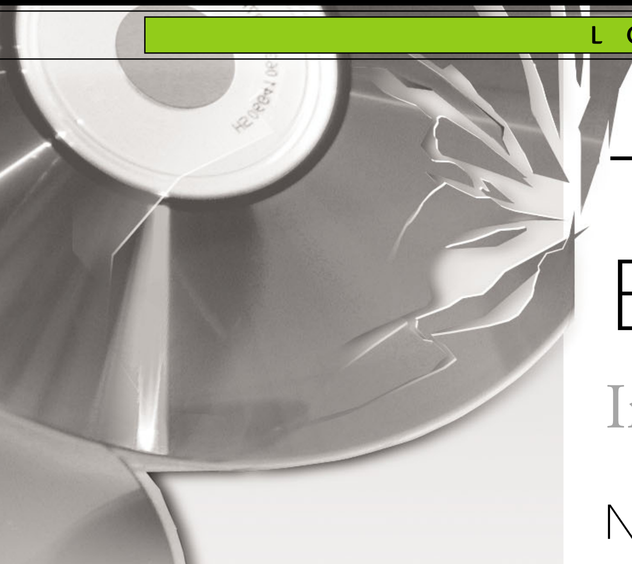
The second system leveraged two Intel "Irwindale" Xeon DP chips, each with 2MB of L2 cache running at 3.6GHz. ASUS was kind enough to send its NCCH-DL, an 875P-based motherboard limited to AGP 8X graphics support. The original plan was to feature another PCI-E platform, but Supermicro, Iwill, and Tyan all turned down the invitation to send an E7525 motherboard for testing. Consequentially, the NCCH-DL was outfitted with an AGP 8X GeForce 6800 Ultra and 2GB of Corsair DDR400 RAM.

We also took a pair of new Opteron 875 dual-core processors running at 2.2GHz and dropped them into the same ASUS K8N-DL motherboard with its latest BIOS. Again, one GeForce 6800 Ultra did the trick, along with 2GB of the Corsair registered DDR400 memory.

Perhaps these results will surprise you. After all, the dual-core Opteron 875 only sweeps one test, the Cinebench 2003 render benchmark. Remember that a pair of 3.6GHz Xeon processors also enables four threads through Hyper-Threading and most of the applications tested seem most responsive to two threads running simultaneously. Two Opteron 252s do the best job of combining raw processing power with multithreaded alacrity here. There are indeed instances where the 875 sprints ahead, such as 2D content creation and PCMark's memory test. However, at 2.2GHz you're not going to see a major improvement unless your software is heavily optimized for multithreading.

Multitasking is another story entirely. The Opteron 875 and Xeon DP systems were able to run Windows Media Encoder at full tilt with roughly 48% processor utilization, leaving plenty of power left over to run other apps. ▲

Workstations Benchmarked	Dual Opteron 252 (2.6GHz)	Dual Opteron 875 (2.2GHz)	Dual Xeon DP 3.6GHz (2MB)
SYSmark 2004			
Overall	276	248	264
Internet Content Creation	351	315	330
3D Creation	316	214	301
2D Creation	418	427	392
Web Publication	327	323	304
Office Productivity		196	212
Communication	208	193	192
Document Creation	263	235	232
Data Analysis	188	166	213
SPECviewperf 8.01			
3dsmax-03	19.56	17.85	19.11
catia-01	13.18	12.6	12.92
ensight-01	13.5	12.98	13.77
light-07	11.89	11.27	10.41
maya-01	22.02	19.71	21.73
proe-03	17.54	15.54	18.14
sw-01	15.75	15.4	16.16
ugs-04	5.268	5.223	5.579
PCMark04	7414	6438	6811
CPU	7122	6177	6776
Memory	3735	4289	5589
Dr. DivX	12:11	14:35	11:54
Windows Media Encoder 9	3:39	4:09	4:23
Cinebench 2003	0:38	0:25	0:38

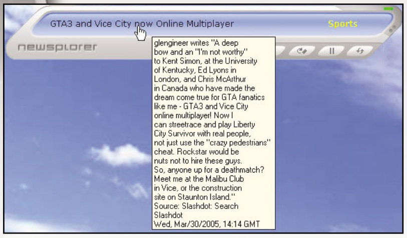


by Warren Ernst

The Bleeding Edge Of Software

Inside The World Of Betas

Newsplorer v.054



glengineer writes "A deep bow and an "I'm not worthy" to Kent Simon, at the University of Kentucky, Ed Lyons in London, and Chris McArthur in Canada who have made the dream come true for GTA fanatics like me - GTA3 and Vice City online multiplayer! Now I can streetrace and play Liberty City Survivor with real people, not just use the "crazy pedestrians" cheat. Rockstar would be nuts not to hire these guys. So, anyone up for a deathmatch? Meet me at the Malibu Club in Vice, or the construction site on Staunton Island."
Source: Slashdot: Search Slashdot
Wed, Mar/30/2005, 14:14 GMT

Official product name: Newsplorer
Version # previewed: v.054
Publisher: Newsplorer
Developer and URL: Newsplorer; www.newsplorer.com
ETA: Q2 2005
Why you should care: A great, free RSS newsreader scroller.

Reading RSS and Atom news feeds is getting almost as common as reading Web pages. There are enough newsreaders now for most every taste. And because they don't interfere with each other and consume little bandwidth, there's an argument for having a few newsreaders on hand. If you buy into this argument, Newsplorer is probably for you.

Newsplorer is a tickertape-style news viewer. Once you give it RSS feeds to keep track of, it constantly scrolls headlines in its window. To stop the tickertape movement, just hover the mouse cursor over the Newsplorer window. Hovering the cursor over a headline displays a pop-up that contains the first few sentences of an article. Clicking the headline displays the article in your Web browser.

Newsplorer is classic beta software; there are some great features and some glaring omissions. The window is fully themeable for different sizes, shapes, colors, and more. Various optional pop-up windows display new headlines as they occur, and they appear just long enough to read completely but not so long to become distracting.

However, scrolling speed is only adjustable in course increments, so finding a flicker-free rate for an LCD is troublesome. Adding new RSS feeds is also cumbersome, requiring a fair amount of cutting, pasting, and clicking; the window isn't resizable using certain skins; and there's no help file.

Still, for a break from work, the gentle, almost soothing scrolling news line is a welcome distraction. Given its free price, there's no reason not to give this a whirl. ▲

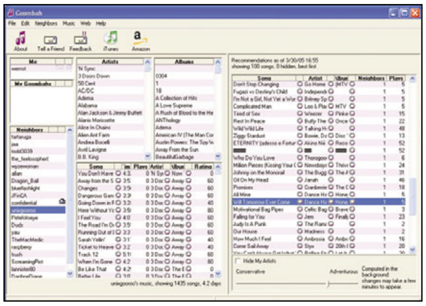
Goombah 0.6 Beta

ITunes has changed how we buy and listen to music. In some ways it's also limited our exposure to new music, as we tend to listen to the same music repeatedly. There are also so many options in the iTunes' store, it's hard to drill down in a timely manner to new music you'll like.

Goombah takes your iTunes' song names, artist names, and playing stats and goes online to its own BitTorrent-based network. Here, it compares your data with other Goombah users to show you what those with similar tastes have that you don't.

This is all done without illegal file sharing going on. When you find a song you'd like to hear, clicking it takes you to the iTunes store or Amazon.com where you can sample and buy it. Goombah gets a commission from the purchase, keeping the app free.

Does it work? Mostly. The libraries it found for me had an eerie similarity to my own, and I found new music I liked, plus favorites I had forgotten about. The UI is cluttered, although it's hard to think of a good alternative because there's so much data to display at once. The app is also slow, as it seemed to be straining to consolidate lots of information at once. Hopefully, the beta has lots of debugging code, and the final version will be quicker. ▲



Official product name: Goombah
Version # previewed: 0.6 Beta
Publisher: Emergent Music
Developer and URL: Emergent Music; goombah.emergentmusic.com
ETA: Q3 2005
Why you should care: A good way to find new iTunes music.

Send Us Your Betas: Know of software in the beta stage that's deserving of some attention? Let us know. We'll take a look at it and possibly give it a go-round. Send your prospects to bleedingedge@cpumag.com.

UP TO SPEED

Upgrades That'll Keep You Humming Along

Aside from numerous maintenance and security releases for BitTorrent and Firefox, this month's big release is Microsoft's Server 2003 SP1, which MS has linked to the launch of Windows XP Professional x64 Edition, Microsoft's 64-bit Windows OS.

Upgrades

Adobe After Effects 6.5.1

The pro-grade video-processing engine gets a bug fix that corrects problems with layering anomalies, slow performance, and CPU usage during inactivity.

Get it at: www.adobe.com

Alcohol 120% 1.9.5.2802

This update of the CD\DVD drive emulator fixes minor bugs, problems associated with IDE drivers, an incompatibility with InCD, and registering the app on restricted Windows accounts.

Get it at: www.alcohol-soft.com

BitTorrent 4.0.1

Follwing the major 4.0 upgrade, this bug fix corrects problems with the installer, UI lock ups after minimization, tracker issues, and a bug involving save and configuration locations in Win95/Me.

Get it at: www.bittorrent.com

Blender 2.36

This open-source 3D-modeling app does rendering, post-production, and animation. This release has versions for Windows, Mac OS X, Linux, and FreeBSD and adds multiple fixes and small additions to the texture, game engine, and interface. The recent 2.35 version added major new functionality across most of the tool set.

Get it at: www.blender3d.org

BlindWrite 5.2.12

The popular tool for making precise 1:1 copies of optical discs gets an upgraded burning engine and new support for dual-layer DVD-R.

Get it at: www.vso-software.fr

C-Organizer Pro 3.3

This organizer/PIM now has network support for real-time data sharing. The UI has been tweaked, and the search feature improved and expanded. Also added were a horizontal ruler, shortcuts, and email and Web-address recognition.

Get it at: www.csoftlab.com

CherryOS 1.2

This G4 emulator can run Apple's Panther OS on a PC. This release promises CPU and system performance boosts of more than 300%, a rewrite of the OS core for better stability, compatibility with dual-processor systems, and bug fixes.

Get it at: www.mxsinc.com

J. River Media Center 11.0.225 Beta

The AV media player has a beta version release that supports the Sony PSP. The JRMC can detect the PSP and directly transfer MP3s, photos, and compatible video files to the Memory Stick.

Get it at: www.jrmediacenter.com

Microsoft Windows Server 2003 SP1

Microsoft's server software gets major new security features, including a Security Configuration Wizard, data execution protection, and Post-Setup Security Update Wizard for more secure first-boot scenarios. This release also improves wireless LAN security by including support for advanced authentication protocols.

Get it at: www.microsoft.com

Morpheus 4.8

The P2P sharing software searches all the major P2P networks. The new version supports BitTorrent and tweaks the load performance.

Get it at: www.morpheus.com

MySQL 4.0.24

The popular database engine plugs several security holes and adds a few configuration options. This release also has a long list of minor bug fixes.

Get it at: www.mysql.com

Thunderbird 1.0.2

The Mozilla email client gets a security fix that tightens defenses against hackers and malicious attacks, plus adds spoofing strategies and improves overall stability.

Get it at: www.mozilla.org

Driver Bay

ATI Catalyst 5.3

The regular Catalyst updates for Radeon cards get a particularly robust set of new features, including eRecord, which logs component errors; Overdrive Version 4, which adds new safety and testing measures for overclocking; and OpenGL 2.0 support.

Get it at: www.ati.com

NVIDIA nTune 2.05.09.08

The high-level tool for adjusting all aspects of most nForce2\3\4-based systems must be implemented through software from the specific motherboard maker. nTune adjusts voltage, clock speed, and other BIOS-level settings from a Windows interface.

Get it at: www.nvidia.com

Realtek AC'97 Sound Software 3.70

This new version for motherboard audio using the Realtek AC'97 codecs adds some customized settings and includes the more substantial updates in 3.69, including a fix for Half-Life 2 sound and changes to SPDIF in\out.

Get it at: www.realtek.com.tw

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by Steve Smith

Bring It All Back

Undelete Software To Recover What You've Lost

Data is precious. It's up to you to make sure that you make backups of everything that matters. You can restore a lost program from its installation disc, but personal data is forever irreplaceable. What to do then if you've deleted something that has no backup, removed something from a network or shared drive, or lost data to a disc that refuses to read correctly?

There's more than one way to get lost data back these days. We looked at three applications that are designed to recover lost data or prevent it from getting lost in the first place. This range of products covers the gamut, including everything from expert-level drive-editing tools to user-friendly applications that use the existing Recycle Bin metaphor. Each of these apps is best suited to different needs and work habits.

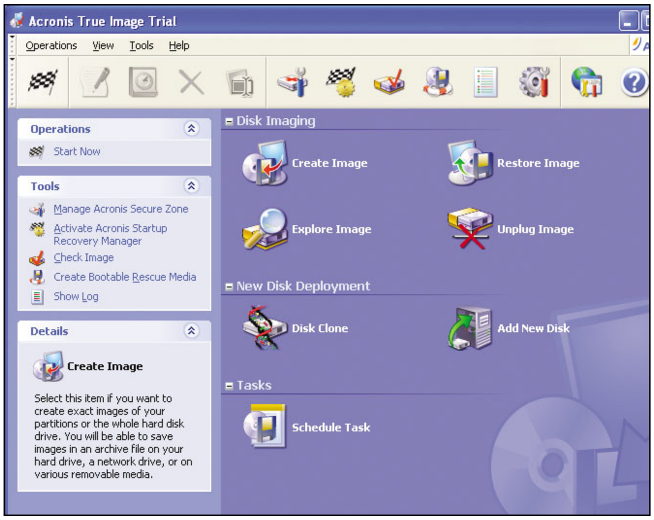
Acronis True Image 8.0

True Image is not so much a file rescue program as it is a drive and partition imaging solution that's designed for backing up and restoring whole systems or drives. The program handles drive imaging in a unique way, and it's actually a little closer in spirit to programs such as Norton GoBack, although it isn't quite as seamless in its operation as that program.

Acronis works by letting the user back up partitions to image files, which you can then mount as actual drives or restore over existing partitions. You can create a protected partition called the Acronis Secure Zone that's hidden from Windows where you can store the image files. These images are either complete copies of a partition or incremental copies of files, such as whatever has changed since the last backup.

In addition, you can also install a Startup Recovery Manager application to restore an image from the protected partition *before* booting into Windows. This is a handy option if you need to do a restoration to a damaged system. An Explore Image function mounts images stored in the Secure Zone as a separate drive in Windows, and you can copy out files selectively.

The downside of using True Image, of course, is that you need to dedicate a fair amount of space to making a complete backup of your system drive. You can't create images of directories, only whole drives or partitions, so it's an all-or-nothing deal. You can set True Image to automatically run a backup cycle at each reboot or log off, but that takes five to 10 minutes on the average. This makes the program best suited for such



Select this item if you want to create exact images of your partitions or the whole hard disk drive. You will be able to save images in an archive file on your hard drive, a network drive, or on various removable media.

Acronis' extremely clean and easy-to-navigate interface takes a lot of the pain out of creating image files and working with partitions.

True Image 8.0
$49.99
Acronis
www.acronis.com

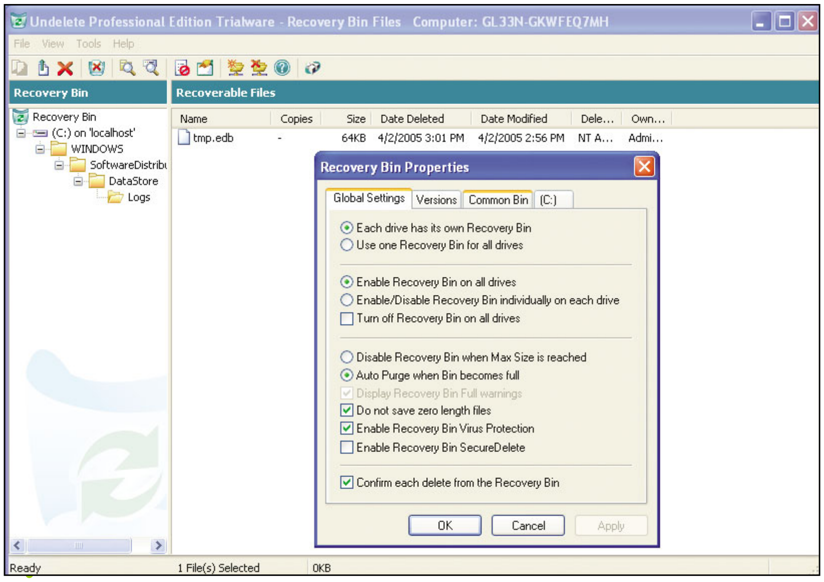
Tips For Using Acronis True Image

You can put data on its own partition and image that. Data takes up less room and is more crucial than applications, which you can always reinstall.

You can image automatically at shutdown. If you're interested in using the program's scheduled imaging feature, set it to image when you're done for the day. This way you can shut down, let True Image image automatically, and forget about it.

If you have a system with a factory restore CD, make a full image of your system to another hard drive and use that for recovery instead, as it'll probably be faster, and you'll be able to restore using your *own* system image. ▲

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect



Name	Copies	Size	Date Deleted	Date Modified	Dele...	Own...
tmp.edb	-	64KB	4/2/2005 3:01 PM	4/2/2005 2:56 PM	NT A...	Admi...

● Each drive has its own Recovery Bin
○ Use one Recovery Bin for all drives

● Enable Recovery Bin on all drives
○ Enable/Disable Recovery Bin individually on each drive
☐ Turn off Recovery Bin on all drives

○ Disable Recovery Bin when Max Size is reached
● Auto Purge when Bin becomes full
☑ Display Recovery Bin Full warnings
☑ Do not save zero length files
☑ Enable Recovery Bin Virus Protection
☐ Enable Recovery Bin SecureDelete

☑ Confirm each delete from the Recovery Bin

Undelete 5.0
$29.95
Executive Software International
www.executive.com

Aside from being easy to work with, you can configure Undelete 5.0 to complement the way just about anyone works.

Tips For Using Undelete 5.0

If you have Microsoft Office installed, Undelete can track file revisions, so you can roll back later versions of a file to an earlier version if needed. This is perfect if you have mistakenly saved over something and you don't have a proper backup.

Undelete lets you configure different bins with different drives, so you can set higher levels of retention on your data drive vs. your system drive.

Worried about sensitive data falling into the wrong hands? Enable the Secure Delete feature. Anything flushed from the Recovery Bin is securely destroyed using a Department of Defense-approved erasure algorithm. ▲

situations where a whole system needs to be protected rather than individual files.

Executive Software Undelete 5.0

Casual users will love Undelete 5.0. It's the least obtrusive, and in many ways the easiest to use, of the programs I tested.

Undelete works through a methodology that Windows users are already familiar with: the Recycle Bin. Here, it is renamed the Recovery Bin, and it has a slew of functionality for restoring data marked as deleted. The Recovery Bin works roughly the same as the Recycle Bin, but instead it holds files deleted by *any* mechanism—by another program or from the command line, for example—and you can inspect the contents of deleted files without having to recover them.

Once the program is installed, you can inspect the Recovery Bin by simply clicking it. It doesn't seem possible to just get a flat list of all the files in the Recovery Bin and quickly sort by name, though. You have to drill through a copy of the folder hierarchy that represents where the file used to be. There is a global search function, however, which partly makes up for this. You can also recover files that were deleted from the Recovery Bin itself up to a point, provided that the files haven't already been overwritten.

"The Recovery Bin works roughly the same as the Recycle Bin, but instead it holds files deleted by any mechanism . . ."

The Undelete CD also has a standalone program called Emergency Undelete that runs from the CD. With it you can recover files without risking further damage to what's been deleted. The only downside is that Windows has to actually be running; it's not a recovery CD program that boots on its own, so it isn't as powerful as it could be.

The most powerful function in the program is only available in the Server Edition of Undelete. With this function you are able to recover files that have been deleted across a network and access Recovery Bins on other computers (provided they're also running Undelete).

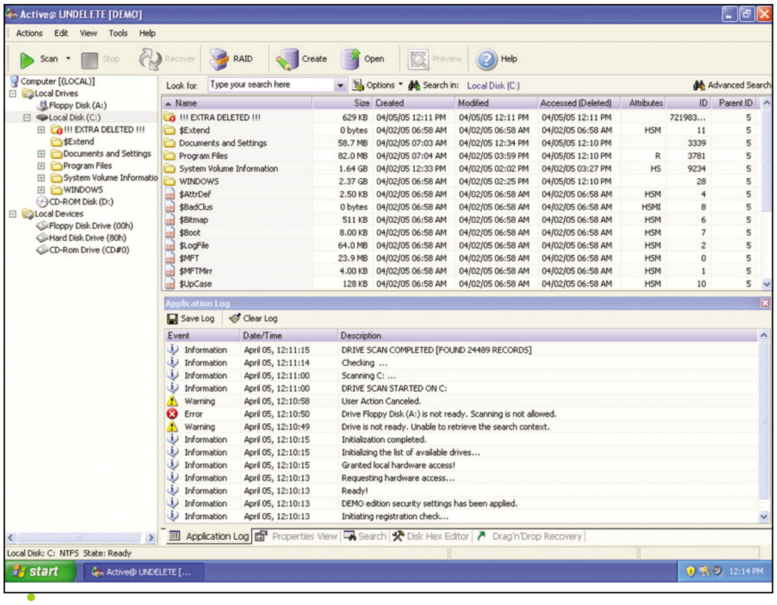
Also worth mentioning is that the program can recover older revisions of Microsoft Office documents, even if they have been saved on top of each other.

LSoft Technologies Active@ Undelete

Active@ Undelete is definitely the most technically advanced of the programs I reviewed. You can scan a drive (fixed or removable), extract detailed information about what files are deleted and still recoverable, preview them before recovery, and even perform byte-level editing on drives.

When you start Active@ Undelete, you are presented with a tree of all the

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect



```
Name                          Size      Created             Modified            Accessed (Deleted)  Attributes  ID         Parent ID
!!! EXTRA DELETED !!!         629 KB    04/05/05 12:11 PM   04/05/05 12:11 PM   04/05/05 12:11 PM               721983...  5
$Extend                       0 bytes   04/02/05 06:58 AM   04/02/05 06:58 AM   04/02/05 06:58 AM   HSM         11         5
Documents and Settings        58.7 MB   04/02/05 07:03 AM   04/02/05 12:34 PM   04/05/05 12:10 PM               3339       5
Program Files                 82.0 MB   04/02/05 07:04 AM   04/02/05 03:59 PM   04/05/05 12:10 PM   R           3781       5
System Volume Information     1.64 GB   04/02/05 12:33 PM   04/02/05 02:02 PM   04/02/05 03:27 PM   HS          9234       5
WINDOWS                       2.37 GB   04/02/05 06:58 AM   04/02/05 02:25 PM   04/05/05 12:10 PM               28         5
$AttrDef                      2.50 KB   04/02/05 06:58 AM   04/02/05 06:58 AM   04/02/05 06:58 AM   HSM         4          5
$BadClus                      0 bytes   04/02/05 06:58 AM   04/02/05 06:58 AM   04/02/05 06:58 AM   HSMI        8          5
$Bitmap                       511 KB    04/02/05 06:58 AM   04/02/05 06:58 AM   04/02/05 06:58 AM   HSM         6          5
$Boot                         8.00 KB   04/02/05 06:58 AM   04/02/05 06:58 AM   04/02/05 06:58 AM   HSM         7          5
$LogFile                      64.0 MB   04/02/05 06:58 AM   04/02/05 06:58 AM   04/02/05 06:58 AM   HSM         2          5
$MFT                          23.9 MB   04/02/05 06:58 AM   04/02/05 06:58 AM   04/02/05 06:58 AM   HSM         0          5
$MFTMirr                      4.00 KB   04/02/05 06:58 AM   04/02/05 06:58 AM   04/02/05 06:58 AM   HSM         1          5
$UpCase                       128 KB    04/02/05 06:58 AM   04/02/05 06:58 AM   04/02/05 06:58 AM   HSM         10         5
```

```
Event        Date/Time             Description
Information  April 05, 12:11:15    DRIVE SCAN COMPLETED [FOUND 24489 RECORDS]
Information  April 05, 12:11:14    Checking ...
Information  April 05, 12:11:00    Scanning C: ...
Information  April 05, 12:11:00    DRIVE SCAN STARTED ON C:
Warning      April 05, 12:10:58    User Action Canceled.
Error        April 05, 12:10:50    Drive Floppy Disk (A:) is not ready. Scanning is not allowed.
Warning      April 05, 12:10:49    Drive is not ready. Unable to retrieve the search context.
Information  April 05, 12:10:15    Initialization completed.
Information  April 05, 12:10:15    Initializing the list of available drives...
Information  April 05, 12:10:15    Granted local hardware access!
Information  April 05, 12:10:13    Requesting hardware access...
Information  April 05, 12:10:13    Ready!
Information  April 05, 12:10:13    DEMO edition security settings has been applied.
Information  April 05, 12:10:13    Initiating registration check...
```

```
Local Disk: C:  NTFS  State: Ready
```

Active@ Undelete
$39.95
LSoft Technologies
www.active-undelete.com

Active@ Undelete has multiple recovery methods for deleted files, from simple file-directory scans to more complex data-reconstruction algorithms.

Tips For Using Active@ Undelete

The program can use more than one MFT (Master File Table) or directory structure on an NTFS drive. Use the backup copy of the MFT if the drive gets blasted and you're worried about data integrity.

If you have proper user permissions on an NTFS drive with encrypted data that you need to recover, you can use Active@ Undelete to decrypt the data to another (non-NTFS) drive. Losing data to both damage and irreversible NTFS encryption is humiliating.

Got a guru on the line to help you troubleshoot problems? Active@ Undelete lets you print out a Hardware Diagnostic File, a manifest for the whole system, so you can spend less time describing what's installed and more time fixing what's broken. ▲

available drives that you can scan for deleted file information. The scanning process doesn't take long, typically only a few seconds, and when it's complete it provides the user with a tree-structured list of all files and folders available for recovery. Once you have found the files to restore, you can drag and drop them into a list and recover them selectively or as a batch.

By default the program uses directory information to reconstruct what's been deleted. An advanced scanning mode searches the drive sector by sector for file recovery information, instead of relying only on directory data. This is useful for recovery operations where the directory might have been damaged, but it takes much longer to run.

Active@ Undelete also lets you create image files from drive partitions and explore them from within the program if you want to perform drive level backups in the manner of Acronis TrueImage. One particularly good feature is the ability to perform undelete operations on drives that were previously part of a RAID array, something that's not allowed by either other program here. Active@ Undelete's Network edition even lets you connect to other machines and perform remote operations, provided they're running the program, too.

The most advanced (and potentially dangerous) feature is probably the program's Disk Hex Editor, with which you can directly edit the contents of any drive. When you fire this feature up, it rather wisely starts off in read-only mode to keep you from accidentally destroying anything. The editor works on drive images, CDs, and anything else that's mountable as a drive. ▲

by Serdar Yegulalp

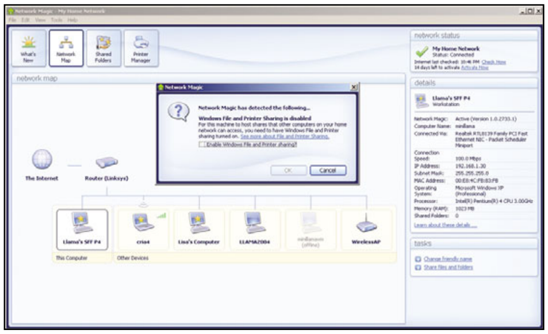
Defeat The Unwanted Delete

When you lose data that you really need back, there are programs that can help. Here are the defining features of the three undelete applications we tested. ▲

Product	**Executive Software Undelete 5.0**	**Acronis True Image 8.0**	**Lsoft Technologies Active@ Undelete**
Price	$29.95	$49.99	$39.95
Best Feature	Recover earlier versions of self-overwritten Microsoft Office files	Scheduled imaging	Restores data from RAID setups
Worst Feature	Standalone undelete tool that requires Windows running	Time required to create a full image	Few concessions for beginners; this is a pro-level tool
Best Suited For	Home and office users	Lab environments; systems that need full-drive protection	Administrators, as part of a toolkit

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Pure Networks Network Magic



Network Magic

Network Magic has detected the following...

Windows File and Printer Sharing is disabled

For this machine to host shares that other computers on your home network can access, you need to have Windows File and Printer sharing turned on. See more about File and Printer Sharing.

☐ Enable Windows File and Printer sharing?

My Home Network
Status: Connected
Internet last checked: 10:46 PM Check Now
14 days left to activate Activate Now

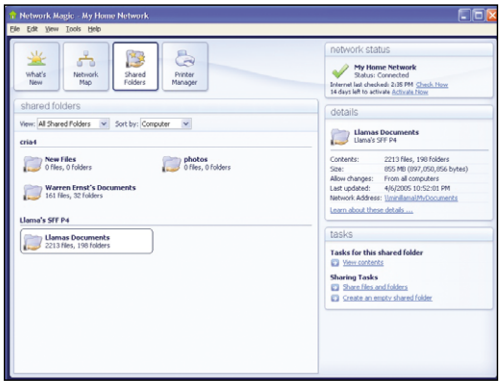
Llama's SFF P4
Workstation

Network Magic: Active (Version 1.0.2733.1)
Computer Name: minillama
Connected Via: Realtek RTL8139 Family PCI Fast Ethernet NIC - Packet Scheduler Miniport
Connection Speed: 100.0 Mbps
IP Address: 192.168.1.30
Subnet Mask: 255.255.255.0
MAC Address: 00:E0:4C:FB:83:FB
Operating System: Microsoft Windows XP (Professional)
Processor: Intel(R) Pentium(R) 4 CPU 3.00GHz
Memory (RAM): 1023 MB
Shared Folders: 0
Learn about these details ...

Network Magic
- $49.95
- Pure Networks
- www.networkmagic.com

Sometimes networking feels like magic, especially once you get it set up and working the way you want. That includes a network that has shared folders on every computer; common printers that are always available; and a distributed, always-on broadband Internet connection. Odds are if you're a regular *CPU* reader, you've not only set up your own home or office network with these features, but you've probably also been called on to do the same for less tech-savvy friends and family. If you don't care to be an impromptu network admin for others, directing them to a copy of Network Magic is a good alternative.

NM sets up the networking of Windows PCs, including shared folders, shared printers, and a shared Internet connection. It also acts as a central window for beginning users to perform virtually all networking tasks instead of having to jump among several windows and dialog boxes as Microsoft intended. Detailed help files demystify virtually all network operations, and clever wizards ask you basic questions in plain English and set Windows' internal settings seamlessly, creating a new network from scratch, as if by, well, you know.



View: All Shared Folders
Sort by: Computer

cria4
New Files
0 files, 0 folders
photos
0 files, 0 folders
Warren Ernst's Documents
161 files, 32 folders

Llama's SFF P4
Llamas Documents
2213 files, 198 folders

My Home Network
Status: Connected
Internet last checked: 2:35 PM Check Now
14 days left to activate Activate Now

Llamas Documents
Llama's SFF P4

Contents: 2213 files, 198 folders
Size: 855 MB (897,050,856 bytes)
Allow changes: From all computers
Last updated: 4/6/2005 10:52:01 PM
Network Address: \\minillama\MyDocuments
Learn about these details ...

Tasks for this shared folder

Sharing Tasks

Once installed on all your computers (one $49.95 license lets you install NM on five computers), NM searches your LAN for equipment, including other computers (either with or without NM installed), a broadband router or firewall, wireless access points, and printers. The program creates an attractive map of everything it finds and lets you assign friendly names (such as Lisa's Computer or Kitchen Printer) to devices. As computers add and remove themselves from the network, NM lets you know about it and updates the map. Although this can get a little annoying, it helps immediately identify any rogue wireless computers that are attaching themselves to your LAN.

You don't need to know anything about networking to set up shared folders and printers. All you need to do to share printers, for example, is click the Printer Manager button, select a printer, and tell NM to share it. NM automatically enables file and printer sharing in Windows, names the printer, copies the printer driver to all the other computers, and pops up a window on all the computers that indicates that there's a new network printer ready to go.

Setting up shared folders is as easy, but there are some limitations. NM can only "easily" share your My Documents folder or subfolders within the My Documents folder. You can share other folders by opening Windows Explorer, right-clicking a folder that you want to share, and choosing Add To Shared Folders. NM won't let you share an entire drive or map shared folders as drive letters, though. You can limit write access to folders, but not on a user-by-user basis: Everyone can write to a shared folder or no one can.

Folders shared this way automatically appear under NM's Shared Folders tab, regardless of the hosting computer, letting NM replace the occasionally confusing Network Neighborhood or the My Network Places icon. Unfortunately, shared folders created with Windows' tools—which is how you would have to share an entire hard drive or share folders on PCs without NM—or shared folders on a Linux or Mac OS computer, don't appear here. That means, in some cases, users might have to go to two locations to use shared network folders.

NM is compatible with dozens of broadband router and firewall devices, but compatibility is highly overrated. A router that's compatible means you can click its icon in the Network Map, click View Management, and a Web browser opens to let you configure the device. You still must enter its access password. You could just as easily type its IP address in your browser yourself, which is what you still have to do with incompatible routing devices and wireless access points.

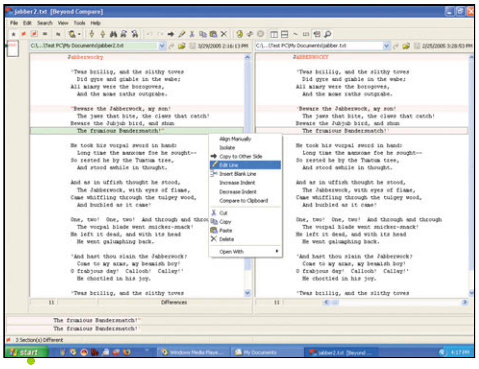
Network Magic's minor annoyances are virtually inconsequential compared to what it manages to accomplish. Virtually anyone, regardless of computer experience, can set up her own Windows network and shared resources safely, easily, and quickly. ▲

by Warren Ernst

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

by Marty Sems

Beyond Compare 2.2.7



Beyond Compare 2.2.7
$30 (30-day free trial)
Scooter Software
www.scootersoftware.com

Copying folders by hand once in a blue moon is no substitute for an automated backup utility. If you've ever learned this the hard way, you probably have multiple versions of certain files with no easy way to reconcile them. Beyond Compare 2.2.7 gives you a highly intuitive and versatile forum in which to compare and edit many types of documents, files, and folders. The shareware can be a lifesaver, yet I was a little frustrated with the current version's limitations.

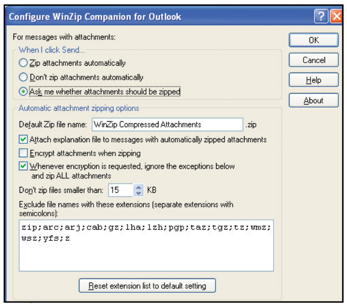
BC2 presents two files or folders in a split window, pointing out the differences between them, focusing on characters more than formatting. It integrates with Windows Explorer's context menus, so you can right-click two selected items and choose Compare, among other options. During folder comparison you can save snapshots of the two directories' current states.

BC2 can compare FTP sites; incorporate scripts to automate tasks, such as folder synchronization; and contrast the contents of many compressed archives (except CABs, ZIPs with 64-bit extensions, and WinZip 9.0's AES-encrypted ZIPs). BC2 also lets you choose the basis of comparison, such as by binary data, CRC checksum, or rules you create.

BC2 doesn't take advantage of common apps already installed on a PC to open files, relying instead on its text editor-like viewer. With no support for Microsoft Word or Excel, for example, or even a level of integration with those apps, it's frustrating to try and compare formatted DOC or XLS files. Scooter Software does offer workarounds, including downloadable rules you can import to convert files to text as BC2 opens them. The site also has free plug-ins for registered users to compare MP3s, binary/hex data files, image files, and more.

This Windows 95/98/Me/NT4/2000/XP version of BC2 has been around awhile. A beta of version 2.3 adds compatibility with Windows Server 2003 and enhances FTP functionality. In the meantime better support for common productivity formats would make Beyond Compare incomparable for more mainstream users. ▲

WinZip Companion For Outlook 1.0



Configure WinZip Companion for Outlook

For messages with attachments:

When I click Send...

○ Zip attachments automatically
○ Don't zip attachments automatically
● Ask me whether attachments should be zipped

Automatic attachment zipping options

Default Zip file name: WinZip Compressed Attachments .zip
☑ Attach explanation file to messages with automatically zipped attachments
☐ Encrypt attachments when zipping
☑ Whenever encryption is requested, ignore the exceptions below and zip ALL attachments
Don't zip files smaller than: 15 KB
Exclude file names with these extensions (separate extensions with semicolons):

```
zip;arc;arj;cab;gz;lha;lzh;pgp;taz;tgz;tz;wmz;
wsz;yfs;z
```

WinZip Companion For Outlook 1.0
$19 (45-day free trial version)
WinZip Computing
www.winzip.com

If your typical workday involves sending scads of email attachments, you're probably in the market for an easy way to compress and encrypt attached files. Most recipients of your email, working under the constraints of a ludicrously small mailbox or attachment size limit, will appreciate smaller files coming their way. I'm reminded of Alice in the cartoon strip "Dilbert" telling an IT person, "Here's a quarter. Go double my storage space."

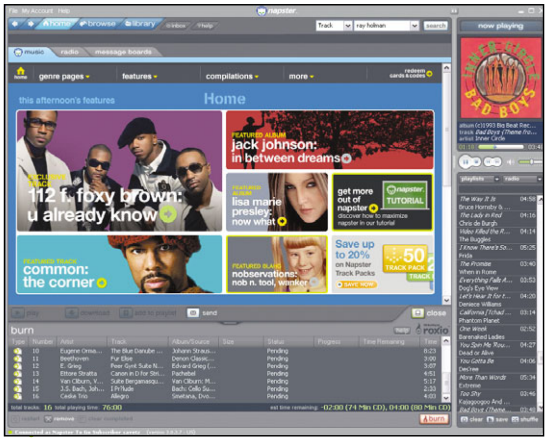
At only $19 WinZip Companion For Outlook is almost as light on your wallet as on your system resources. It's pretty Microsoft-centric, supporting only Outlook 2000 to 2003 (available with the last few editions of Office) running under Win98/NT/Me/2000/XP. Companion ran stably on our 1.5GHz Pentium M laptop with Outlook 2003 and WinXP Pro, and it didn't slow anything down. And no, it doesn't install at all if you only have Outlook Express.

Companion inserts two icons on a new email message's Standard toolbar. These icons let you zip and insert files or configure the utility. You can set also Companion to compress and/or encrypt attachments automatically, or to ask you whenever you click Send. However, the latter setting will still prompt you even if you've already compressed all attachments. ZIP is, predictably, your only archival format option, and there's no compression level adjustment. It's important to know, however, that it doesn't matter to Companion which email client your recipients use.

Companion is relatively light on security as a tradeoff to make its encryption easy to use. Recipients can open your encrypted attachments with a password that you can phone or text them. They don't have to mess around with keys or install Companion on their own systems. However, recipients may need WinZip 9.0 to decrypt the type of ZIP in which Companion wraps files if you choose AES-2 encryption (128-bit or 256-bit) instead of WinZip's weaker Zip 2.0 algorithm. WinXP and WinZip 8.1 were unable to open such AES-encrypted attachments on our system, but WinZip 9.0 worked great. WinZip 9.0 and Companion 1.0 are available as a $38 bundle, which is a $10 savings. ▲

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Napster


napster
home
browse
library
inbox
help
now playing
music
radio
message boards
genre pages
features
compilations
more
this afternoon's features
Home
112 f. foxy brown: u already know
jack johnson: in between dreams
lisa marie presley: now what
get more out of napster
TUTORIAL
common: the corner
nobservations: nob n. tool, wanker
Save up to 20% on Napster Track Packs
50 TRACK PACK
burn
roxio

Napster
$9.95 or $14.95 per month
Napster
www.napster.com

The word Napster was once synonymous with free music downloads. The first iteration of the program was a peer-to-peer client for sharing (um, some would say "stealing") music online. Today, the word Napster means legal music downloads. The company has shed its similarity to other P2P programs that specialize in P2P sharing and now has more in common with the iTunes Music Store.

Unlike the iTunes Music Store, which is aimed at selling songs for 99 cents each, Napster is primarily a subscription service. For a monthly fee, you get unlimited access to the vast Napster music collection.

There are three levels to the Napster service. The basic Napster account ($9.95 per month) lets you listen to music on your PC. A Napster To Go account ($14.95 per month) adds the ability to transfer your Napster music to a handful of compatible portable music players, including models from iRiver and Samsung, the Creative Zen, Dell DJ, the Gateway MP3 Photo Jukebox, and Windows mobile-based phones. Of the popular MP3 players on the market, Napster To Go works with relatively few, and it doesn't work with the iPod. (To see a complete list of compatible players, go to www.napster.com/compatible_devices.)

Both services let you download and listen to unlimited songs, but only as long as you remain a subscriber. If you let your account lapse, those music files become useless. If you don't mind paying a monthly subscription fee for an ethereal music collection, Napster and Napster To Go can be good ways to enjoy an huge, varied mix of songs without committing to buying them. Neither service lets you burn songs to CD, however.

The third level of service, Napster Light, lets you purchase tracks for 99 cents each. Once you've purchased songs, you can burn them to an audio CD and copy them to a larger number of MP3 players that don't support Napster To Go's digital rights management. You can use Napster Light in combination with one of the subscription services or by itself, in which case the service is on par with the iTunes Music Store.

With any level of service, Napster's range of music is enormous and eclectic, with more than 1 million tracks from 65,000 artists available in genres that include everything from classical to pop to Latin. These numbers are comparable to the number of tracks reportedly available at iTunes (although neither service releases exact numbers).

You can search Napster by genre, artist, track name, or album name to find the music you want. I searched for dozens of popular and not-so-popular artists, and most were well-represented. A notable exception was The Beatles, a group that's also missing from the iTunes Music Store.

To hear a certain style of music, perhaps including some artists that you aren't yet familiar with, ready-made compilations are available to let you hear themed tracks, such as 1980s hair bands or old-school funk. For online listing there's a Radio mode, which delivers continuously streaming music in your choice of more than 50 genres. The audio quality was excellent for both offline and streaming downloads.

Napster's interface is somewhat cluttered, but navigation is generally easy and intuitive. Napster requires Windows XP or 2000 and Windows Media Player 7.1 or higher. Napster To Go requires WinXP and WMP 10, plus a compatible portable player.

Whether Napster is right for you will really depend on your choice of portable player and your overall philosophy on paying for music. If you have a compatible player (or you just want to listen at your computer) and want an eclectic, ad-free music stream, a Napster subscription could be a good choice. For music lovers a subscription can be a great way to discover new artists and even entire genres without being limited to 30-second sample clips.

If you are opposed to paying a monthly subscription for music that you can't hear anywhere, anytime, on any media, however, Napster's subscription services will raise your hackles. In this case you're better off with the 99-cent downloads from Napster Light or iTunes Music Store. ▲

by Kevin Savetz

You can search **Napster** by genre, artist, track name, or album name to find the music you want.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Dialogue Box

Would You Like Fries With That?

by Chris Pirillo

What do hamburgers have to do with software? Everything.

For dinner the other night, we decided to return to a new, favorite sushi joint in Seattle. We were ready to order another small round of nibbles, but the chef had decided to close the bar without taking a "last call." Disappointed, my fiancée (Ponzi) suggested we go get a Dick's hamburger (Dick's Drive-In; ddir.com). Dick's is a Seattle institution, and the drive-in hasn't really changed much in 50 years. The menu is straightforward: burgers, folks—hamburgers, plain and simple. Well, Ponzi did choose to get a Deluxe meal. I opted for a regular hamburger, contending that it would taste the same as one from any other fast food joint. It was time to prove myself wrong.

"OK, now that I've had a Dick's burger, I gotta try one from McDonald's to do an immediate taste comparison."

We drove home stopping by a McDonald's to order a plain ol' hamburger. The drive-thru lackey seemed shocked, offended that we didn't want to order anything more. "Are you sure that's all you want?" Yes, we're sure. "You don't even want . . ." Just hand over the burger, buddy. From the first bite, I could tell that I was eating an inferior treat. Although it had dehydrated onions and a pickle, the meat didn't taste like meat, which immediately set it apart from the truly genuine Dick's experience. That's one point for the Dickmeister. But I couldn't stop there!

Two blocks away sat a Burger King. Despite its creepy new television commercials, I thought I'd give 'em a go, too. In between the time we placed the order and the time we picked it up, I got the strangest taste in my mouth. Boy, that McDonald's hamburger was backfiring something fierce. Dude, this was one nasty aftertaste! No wonder it sells soda by the gallon. To rid myself of the sensation, I started to lick my leather wallet. That didn't really help, but at least I wasn't tasting whatever product I had just purchased at 97 cents. Before I started sucking on something else, the Burger King burger was ready. Flame broiled? Flame blah. Sesame seeds on the bun? Big deal. It tasted the same—tasteless. But I couldn't stop there!

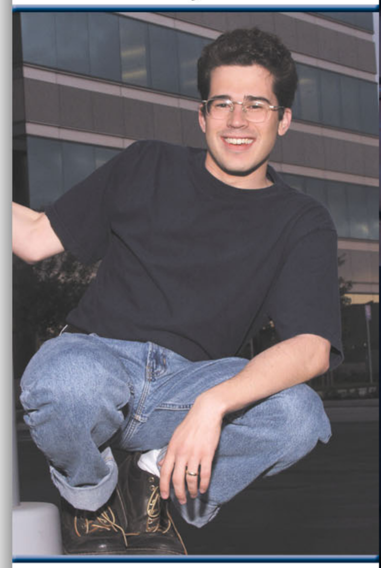
Wendy's was only a minute up the street, so it only seemed fair to give the red-headed stepchild of the fast food industry a fair shake. I could only get through half of the BK burger before wrapping it up and saving it for later (upon Ponzi's request). We ordered the junior hamburger instead of a single, as that was the closest thing to the other burgers from tonight's taste test trip around town. I could smell char on my own breath, but I'm not sure if that was reconstituted char or true grill char. I didn't have much time to think about it, as the Wendy's burger was in my hands quicker than you could say, "Would you like fries with that?" My first impression: fresh, very fresh. The pickle and ketchup were still cold! My second impression: This is an awful lot of bread and a patty of pseudo-meat.

And what do hamburgers have to do with software? Again, everything.

There are hundreds of applications out there that seemingly do the same thing, but only one or two from a specific genre are actually worth your resources and/or money. It's the title from an obscure, lesser-known author that should be capturing your attention. Yeah, this one has fancier buttons, and that one has a better help file. But the moral of my story is never stop trying new software. Certainly, you wouldn't want to stop until you find the perfect program for a particular set of tasks, but even so there are plenty of hamburgers out there for you to try. When you lock yourself into the "I refuse to use anything else" mentality, you're missing out on too many great experiences. Install some kind of virtual machine software (Virtual PC or VMware will do), and never stop playing with what programmers are continually creating. FWIW, the best software out there is made by the lesser-known chefs.

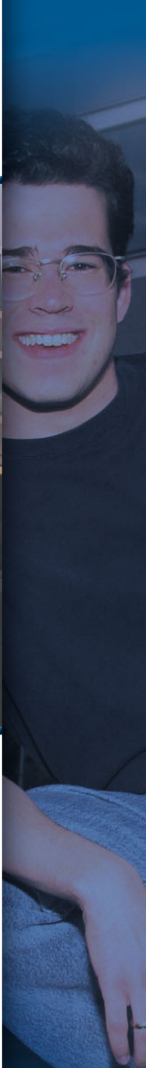
Think about it. ▲

You can dialogue with Chris at chris@cpumag.com.



Chris Pirillo is busy prepping for his fifth annual conference at the end of June: Gnomedex! Everybody dreams of meeting industry influencers face to face, and Chris is bringing a few of them to Seattle for his conference for entrepreneurs and tech enthusiasts. This year's theme: Producing, Consuming & Monetizing Technology. He's doing his best to provide ideas and contacts to folks who are still finding certain terms (such as RSS or podcasting) difficult to grasp. It may not be too late for you to attend. Swing by Gnomedex.com for more information!

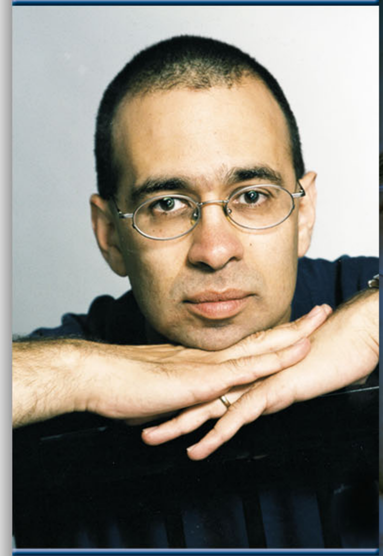
> It's the title from an obscure, lesser-known author that should be capturing your attention.



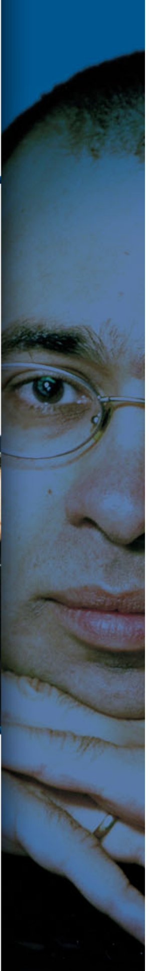
Open Sauce

Four Raves & Three Rants

by Pete Loshin



Pete Loshin, former technical editor of software reviews for Byte Magazine *(print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.*



The Raves

1. Project Looking Glass (lg3d.dev.java.net) heralds a new wave of usability with eye-popping 3D GUI innovation. Imagine your desktop GUI as really and truly 3D, where you can turn, rotate, maneuver, and manipulate windows, icons, and more. Imagine running a video feed in one window and angling it slightly to make more room on your desktop so you can still see it, but it doesn't take up too much space, and when you need to give it your full attention you can quickly angle it back.

Well, it's almost here. If you're brave, try testing the lg3D LiveCD. At this writing, the public download was withdrawn, but you can subscribe to its mailing list to stay updated.

2. Asterisk (www.asterisk.org) turns a PC into a full-featured PBX and your home phone into a gateway to corporate HQ. From the project description, ". . . a complete PBX in software. It runs on Linux and provides all the features you would expect from a PBX and more. Asterisk does voice over IP in three protocols, and can interoperate with almost all standards-based telephony equipment using relatively inexpensive hardware." Features include voicemail services with directory, call conferencing, interactive voice response, call queuing, three-way calling, caller ID services, and more.

Too complicated? There's Asterisk@Home (asteriskathome.sourceforge.net) for home users. And check out Kerry Garrison's article, "Building Your Own PBX with Asterisk" (techdatapros.com/asterisk), or read "Build Your Own PBX" at geekgazette.com. It's all good.

3. Puppy Linux (www.goosee.com/puppy/multi-puppy.htm) is a LiveCD distro that lets you boot from and write to the same CD-R. You boot from a multisession LiveCD, and Puppy Linux (only about 50MB) goes into RamDisk so you can use other CDs during your session. At shut down you insert the LiveCD, and Puppy writes your changed files to a CD track. You can fit up to 99 tracks (or until you fill the CD-R), after which you can use a new CD-R.

4. If you've ever clicked an EULA, and you know you have, read the EFF position paper, "Dangerous Terms: A User's Guide to EULAs" (www.eff.org/wp/eula.php), to understand why they're so bad for you.

And Rants

1. *The Wall Street Journal* reported March 11 that Microsoft will give security patches to the U.S. government up to a month before anyone else. A similar story in BetaNews (www.betanews.com) the same day explained that it's part of a half-billion dollar deal with the U.S. Air Force. The Air Force joins the Security Update Validation Program, under which the government gets to peek at Microsoft code and beta-test security patches.

MS distributes "early" patches and word of vulnerabilities to organizations that pay for them; the actual, tested fixes are never held back from the public. It's not a plot to favor the U.S. government with secrets, but it is typical of the foolhardiness of security by obscurity. Now disgruntled government workers can exploit Microsoft vulnerabilities well before anyone has fixes.

2. What do you do with a wildly successful commercial software product like Visual Basic 6? Kill it, of course. Despite the outcry from its most loyal MVPs (Most Valued Professionals), Microsoft will have terminated free support, an irrevocable step in ending the product's life, for VB6 as you read this. So, if you've invested much time in learning VB6, you now have to invest even more time to master Visual Basic .NET, not to mention the mandatory upgrade.

3. Longhorn is coming! Theoretically, the beta could even be out now, as Microsoft announced it would ship mid-2005. Rollout could be as early as mid-2006. Get ready to spend, spend, and spend on new hardware and training. Need I remind anyone that this can never happen with open-source software? If you like the program, you can use it as long as you want to. If the original developer wants to move on, you can always hire another one to support you.

Have a real business need for open-source software? Let me know, and I'll pick the best ones to write about. Next month, your questions about Linux and my answers. ▲

> Now disgruntled government workers can exploit Microsoft vulnerabilities well before anyone has fixes.

You can get saucy with Pete at pete@cpumag.com.

Firefox Extensions

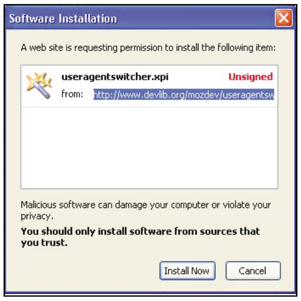
Boost Your Browser To New Heights

Firefox has a lot more going for it than standards compliance, a lack of security holes, and the low price of nothing; Firefox was designed to be easy to expand by downloading small modules called extensions. These extensions were designed to be easy to program by developers. As a result, there are hundreds of extensions that add about as many features to the Firefox browser.

But didn't Internet Explorer and Netscape already do this? No, you're thinking of plug-ins. Plug-ins let a Web browser display content other than HTML. Firefox extensions, on the other hand, add new features to the browser itself, ranging from small interface enhancements to full-on extra applications and everything in between.

Adding extensions to Firefox is relatively simple, but finding useful ones can be a chore. Even assuming that all available extensions are conveniently located in one place (they aren't), finding the diamonds in the rough can be a challenge. There are extensions that do the same thing, and some extensions don't like to play nicely with other extensions or are themselves a little unstable.

Because of this, a lot of users, even if they know about extensions, are a little afraid to check them out. How do you install/uninstall them? Where do you find them? Which ones should you check out first? To answer these and other extension questions, keep reading.



A web site is requesting permission to install the following item:

useragentswitcher.xpi Unsigned

from: http://www.devlib.org/mozdev/useragentsw

Malicious software can damage your computer or violate your privacy.

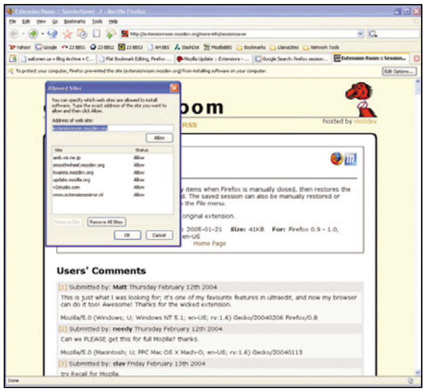
You should only install software from sources that you trust.

Firefox will always display a prompt before installing an extension, so there's no chance of a rogue extensions sneaking into your browser.

Installing & Uninstalling Extensions

Although the extension management interface doesn't exactly leap out at you, to install an extension click the link on the Web page (usually labeled Install or something similar) and a dialog box asks if you want to install the extension.

If you've never installed an extension before from the site, Firefox blocks the installation for security purposes and prompts you to add the site to its list of trusted sites.



Users' Comments

[1] Submitted by: **Matt** Thursday February 12th 2004

This is just what I was looking for; it's one of my favourite features in ultraedit, and now my browser can do it too! Awesome! Thanks for the wicked extension.

Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.6) Gecko/20040206 Firefox/0.8

[2] Submitted by: **needy** Thursday February 12th 2004

Can we PLEASE get this for full Mozilla? thanks.

Mozilla/5.0 (Macintosh; U; PPC Mac OS X Mach-O; en-US; rv:1.6) Gecko/20040113

[3] Submitted by: **clav** Friday February 13th 2004

try Recall for Mozilla

Once you add the site to this list, click the install link and restart Firefox.

To uninstall an extension, click the Tools menu, Extensions, the extension you want to uninstall, click the Uninstall button, and then restart Firefox. In addition, if an extension has any configuration options or preferences, you can set them in the Extensions window, too: Click the extension you want to configure and click the Options button.

The Extensions window also displays a hyperlink to the main extensions repository at addons.update.mozilla.org/extensions/; however, this list is not complete and frequently lists older versions. Consequently, it may be worthwhile to find the home page of an extension to get the latest version.

Tabbed Browsing Enhancements

One of the major interface differences between Firefox and IE is tabbed browsing (the ability to view more than one Web page within a single browser window). Although there's nothing wrong with the built-in tools for working with tabs, you can supercharge Firefox's tabbed functionality with the right extensions.

Tabbrowser Preferences 1.2.2
(www.pryan.org/mozilla/site/TheOneKEA/tabprefs)

If *anything* about Firefox's tabs bugs you, Tabbrowser Preferences can fix it. Do you want to force new windows to appear in new tabs instead? Would you rather your tabs appear on the bottom of the browser window like a miniature taskbar for your browser? TP can do all this and much more. And although there are other tab-enhancing extensions out there, TP shines in two areas: First, the configuration screen is straightforward, well organized, and conveniently located in the main Firefox Options window, so it is easy to get tabs working the way you want. Second, TP is stable, which can't be said for every extension out there.

Tab Clicking Options 0.5.1
(twanno.mozdev.org)

Once you set tabs the way you like them, you'll soon find that right-clicking a tab and then choosing an option from the pop-up menu again and again is annoying. Tab Clicking Options frees you from the pop-up menu. For instance, TCO lets you set any type of mouse click to nearly any type of tab-controlling command. You can set a double-click, middle-click, or left-click (while pressing CTRL, ALT, or SHIFT) to close a tab, open a new tab, reload the contents of a single tab or all tabs, and so forth. In addition, TCO works with other tab-related extensions.

SessionSaver 0.2 d1 Nightly build 27 (extensionroom.mozdev.org/more-info/sessionsaver)

SessionSaver saves your sessions. For example, if you have six tabs open, each with a different site, you can close your Firefox window, shut down your computer, and the next time you open the browser, all the sites will automatically reopen in their tabs. This is perfect for sites you want to check back with later but do not want to bookmark. It also works if Firefox crashes or freezes, but is smart enough to reset the tabs when it detects reopening a site will cause another crash.

The latest version adds a SnapBack Tab feature. If you accidentally close a tab, SnapBack can "undo" it for up to 10 of the most recently closed tabs. This feature replaces the functionality of a few other extensions and it's compatible with TCO.

miniT (drag+indicator) 0.5 (v2studio.com/k/moz)

miniT lets you drag and drop tabs around the Firefox window so that you can group tabs together and change their order (amazingly, this function isn't built in). Several versions of this extension exist, but miniT 0.5 displays an arrow that indicates where the dragged tab will land when you release the mouse button.

SuperDragAndGo 0.2.4 (morphis.eu.org)

Though not strictly a tab enhancement, SuperDragAndGo makes the most of the tabbed browsing interface. SDAG lets you drag nearly anything on a Web page, without having to highlight it first, and opens a new tab. Dragging a hypertext link, or even an otherwise nonclickable URL name, opens the new page directly.

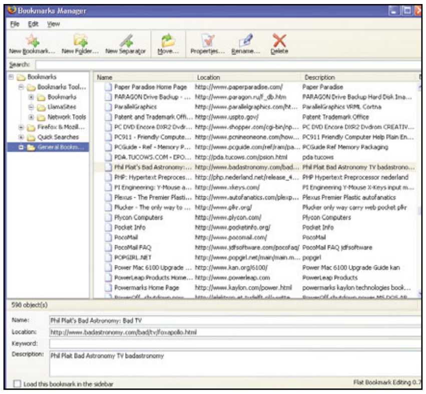
Dragging a word or phrase opens a new tab and displays search results on what you dragged using whatever the default search engine is in the search bar. Also, dragging a graphic starts downloading it in the download manager.

Bookmarking & Site Archiving Enhancements

Whether you import IE's Favorites or build a list of bookmarks on your own, there are several extensions that make dealing with your list of saved sites easier and faster.

Flat Bookmark Editing 0.7 (bluweb.com/us/chouser/proj/mozhack)

The standard Firefox Bookmarks Manager window leaves a lot to be desired if you have to manage a large number of bookmarks. For starters, to alter a bookmark's name, URL, keyword, or description, you need to right-click the bookmark and use the pop-up menu for every detail and bookmarked site.



Name	Location	Description
Paper Paradise Home Page	http://www.paperparadise.com/	Paper Paradise
PARAGON Drive Backup - ...	http://www.paragon.ru/f_db.htm	PARAGON Drive Backup Hard Disk Ima...
ParallelGraphics	http://www.parallelgraphics.com/ht...	ParallelGraphics VRML Cortna
Patent and Trademark Offi...	http://www.uspto.gov/	Patent Trademark Office
PC DVD Encore DXR2 Dvdr...	http://www.shopper.com/cgi-bin/np...	PC DVD Encore DXR2 Dvdrom CREATIV...
PC911 - Friendly Compute...	http://www.pcnineoneone.com/how...	PC911 Friendly Computer Help Plain En...
PCGuide - Ref - Memory P...	http://www.pcguide.com/ref/ram/pa...	PCGuide Ref Memory Packaging
PDA.TUCOWS.COM - EPO...	http://pda.tucows.com/psion.html	pda tucows
Phil Plait's Bad Astronomy:...	http://www.badastronomy.com/bad...	Phil Plait Bad Astronomy TV badastrono...
PHP: Hypertext Preproces...	http://php.nederland.net/release_4...	PHP Hypertext Preprocessor nederland
PI Engineering: Y-Mouse a...	http://www.xkeys.com/	PI Engineering Y-Mouse X-Keys input m...
Plexus - The Premier Plasti...	http://www.autofanatics.com/plexp...	Plexus Premier Plastic autofanatics
Plucker - The only way to ...	http://www.plkr.org/	Plucker only way carry web pocket plkr
Plycon Computers	http://www.plycon.com/	Plycon Computers
Pocket Info	http://www.pocketinfo.org/	Pocket Info
PocoMail	http://www.pocomail.com/	PocoMail
PocoMail FAQ	http://www.jdfsoftware.com/pocofaq/	PocoMail FAQ jdfsoftware
POPGIRL.NET	http://www.popgirl.net/main/main.m...	popgirl
Power Mac 6100 Upgrade ...	http://www.kan.org/6100/	Power Mac 6100 Upgrade Guide kan
PowerLeap Products Home...	http://www.powerleap.com	PowerLeap Products
Powermarks Home Page	http://www.kaylon.com/power.html	powermarks kaylon technologies book...

598 object(s)

Name: Phil Plait's Bad Astronomy: Bad TV

Location: http://www.badastronomy.com/bad/tv/foxapollo.html

Keyword:

Description: Phil Plait Bad Astronomy TV badastronomy

☐ Load this bookmark in the sidebar

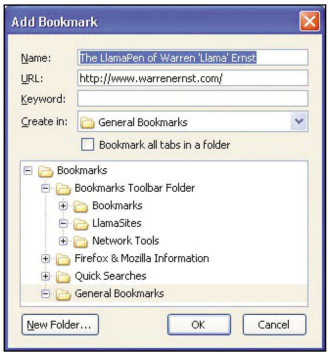
Flat Bookmark Editing 0.7

When it comes to editing dozens of bookmarks at once, nothing is as slick as having all possible fields visible at once.

Flat Bookmark Editing displays all of a bookmark's information automatically in fields at the bottom of the window; just select a Bookmark and start updating fields without any extra clicks. FBE also displays bookmark folders similar to Windows File Explorer, so moving bookmarks from one folder to another, even if the folders are large, is fast and easy.

OpenBook 1.2.0 (www.chuonthis.com/extensions/openbook.php)

If you're using folders to group your bookmarks, then OpenBook should be high on your list. OB remembers in which folders you recently saved your bookmarks and shows a list of them in the Add Bookmark dialog box. It also displays a collapsible-tree view of your folders, so you can just pick a new folder directly. Future versions will also let you directly add comments to bookmarks, too.



Name: The LlamaPen of Warren 'Llama' Ernst

URL: http://www.warrenernst.com/

Keyword:

Create in: General Bookmarks

☐ Bookmark all tabs in a folder

A worthy alternative to OpenBook is Add Bookmark Here 0.5.3 2004-11-13 (gorgias.de/mfe), which adds an Add Bookmark Here command at the bottom of every Bookmark menu, including those from nested folders.

Neither extension interferes with the other, so you can install both with no ill effects.

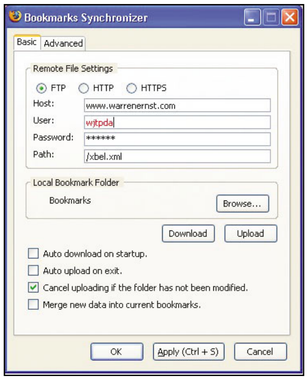
ScrapBook 0.14.1 (amb.vis.ne.jp/mozilla/scrapbook)

Bookmarks are great, but they fall flat on their face sometimes. If you're bookmarking a page for something, but then the page changes or is taken down, you can't get what you're looking for any more. Bookmarks also aren't useful for retrieving information when you can't get online. For these occasions, ScrapBook is the answer.

Scrapbook saves Web pages to your hard drive, images, links, and all, but it also automatically makes its own set of "bookmarks" for these saved pages. This makes retrieving saved pages fast and simple, no matter where you are, how old the page is, or whether you can get online. You can also search through saved pages, add notes, and save "snippets" of pages in order to save space. Scrapbook also keeps the URLs in saved files intact, so you can still jump off to online links if you have a connection.

Bookmarks Synchronizer 1.0.1 (addons.update.mozilla.org/extensions/authorprofiles.php?id=22)

If you have Firefox installed on multiple computers, you probably want to have the same bookmarks available all around. If so, Bookmarks Synchronizer, though



● FTP ○ HTTP ○ HTTPS
Host: www.warrenernst.com
User: wjtpda
Password: ******
Path: /xbel.xml
Bookmarks
☐ Auto download on startup.
☐ Auto upload on exit.
☑ Cancel uploading if the folder has not been modified.
☐ Merge new data into current bookmarks.

not perfect, is the best of the breed. Provided you have access to an FTP or Web server, BS can upload or download your bookmarks with just one or two clicks and optionally merge new bookmarks into your existing bookmarks (be warned, this takes a lot of time). BS can even perform these tasks automatically upon starting and quitting Firefox.

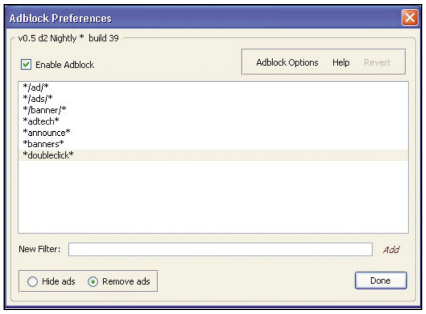
General Browsing Enhancements

These last extensions don't fall into any specific category, but they make using Firefox and the Web much more enjoyable.

Adblock v.5 d2 nightly 39

(adblock.mozdev.org)

If banner ads have gotten you down, then Adblock will perk you right up. Just right-click a banner ad, click Adblock Image from the pop-up menu, click OK in the New Filter (use * as wildcard): dialog box, and the ad disappears and will remain gone the next time you visit that page. If you want to be really proactive, you can manually enter some anti-ad filters yourself and they will start blocking many ads immediately.



v0.5 d2 Nightly * build 39
☑ Enable Adblock

```
*/ad/*
*/ads/*
*/banner/*
*adtech*
*announce*
*banners*
*doubleclick*
```

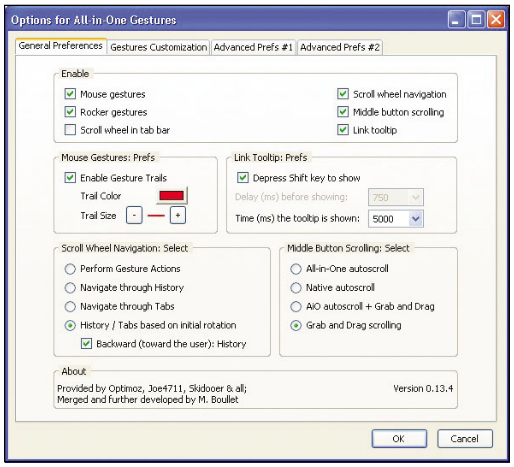
New Filter:
○ Hide ads ● Remove ads

You can give Adblock a head start by telling it to filter these lines of text from URLs.

All-in-One Gestures 0.13.4

(perso.wanadoo.fr/marc.boullet/ext/extensions-en.html)

You can use the right mouse button for more than calling up a pop-up menu. With All-in-One Gestures, you can use the right mouse button to perform PalmOS-like graffiti gestures as shortcuts. Why click the back button when you can just hold down the right mouse button and quickly move your mouse to the left?



Enable
☑ Mouse gestures
☑ Rocker gestures
☐ Scroll wheel in tab bar
☑ Scroll wheel navigation
☑ Middle button scrolling
☑ Link tooltip

Mouse Gestures: Prefs
☑ Enable Gesture Trails
Trail Color
Trail Size

Link Tooltip: Prefs
☑ Depress Shift key to show
Delay (ms) before showing: 750
Time (ms) the tooltip is shown: 5000

Scroll Wheel Navigation: Select
○ Perform Gesture Actions
○ Navigate through History
○ Navigate through Tabs
● History / Tabs based on initial rotation
☑ Backward (toward the user): History

Middle Button Scrolling: Select
○ All-in-One autoscroll
○ Native autoscroll
○ AiO autoscroll + Grab and Drag
● Grab and Drag scrolling

About
Provided by Optimoz, Joe4711, Skidooer & all;
Merged and further developed by M. Boullet
Version 0.13.4

You can give Adblock a head start by telling it to filter these lines of text from URLs.

Furthermore, AIOG also comes equipped with more than 20 predefined gestures, which it can associate with more than 50 commands. Setting them to do what you want couldn't be simpler, either.

User Agent Switcher 0.6.4

(www.chrispederick.com/work/firefox/useragentswitcher)

Some Web pages work just fine with Firefox, but only when you set it to tell Web servers that it's actually some other browser such as IE. User Agent Switcher makes it easy to make Firefox look like IE, Netscape, Opera, or anything else. Just click Tools, User Agent Switcher, and then select the browser you want to imitate.

Copy Plain Text 0.2.1

(mozmonkey.com)

Don't you hate copying text from your browser, pasting it into Word or Excel, and discovering it copied all the text formatting too? With Copy Plain Text all your copied text is transferred to the clipboard without any font, size, or color information. When you paste text into Office applications, it will look like the rest of the text in your document.

Stop-or-Reload Button 0.1

(v2studio.com/k/moz)

In some browsers the stop and reload buttons are the same button on the toolbar because you can't stop and reload a page at the same time. Stop-or-Reload Button combines these two buttons, saving tool-bar space for other features or a longer address field.

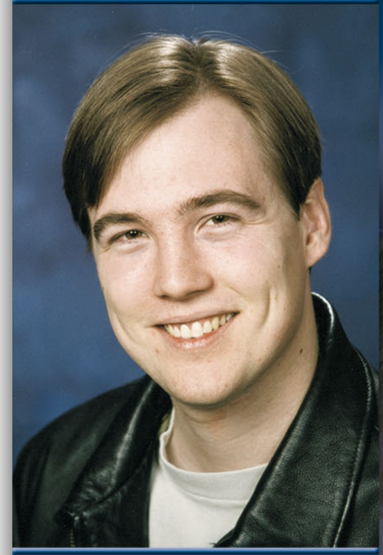
Find Your Own Extensions

By now you've hopefully tried a few extensions and realized how much time and aggravation they can save, and perhaps you've whetted your appetite for other extensions, too. The official Mozilla Extension site is a good place to start, but you might also consider searching Google for problem-solving extensions, as well. CPU

by Warren Ernst

viral.txt

by Rob “CmdrTaco” Malda



Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

It used to be that commercials were easy to spot. Those were the good old days. The late ’90s had only a few formats for banner ads, which were typically near the top of the page, and you could look at them, click them if you liked what you saw, but most likely scroll on.

But as the search for the almighty buck has continued to grow, the line between entertainment and advertising continues to blur. The judges on “American Idol” drink out of Coke glasses. The now legendary McGriddle campaign caused the entire GameSpot Web site to look like Ronald McDonald got sick all over it. The front pages of many major news sites are an indistinguishable tangle of commercials and headlines, and in some cases, the line between the two is unacceptably blurry.

The front pages of many major news sites are an indistinguishable tangle of commercials and headlines, and in some cases, the line between the two is unacceptably blurry.

This is happening inside video games, too. The next generation of online MMORPGs will include in-game billboard signs. I’m sure that some players might take issue with their medieval castle hocking Starbucks or desert cantina advertising Viagra, but this is the way of the future—as long as it’s clearly marked.

Of course, we’ve got the evilest end of the spectrum, too: spam. Those ads are littered with misspellings and false grammar. Now I’m no master of language, but I’m not asking for your credit card either. I really wonder who is, in fact, purchasing c1al1s and v14gra—presumably tomorrow’s identity theft victims. At least most of the time, however, it’s pretty clear that you’re looking at advertising. Even pop-under Web browsers are quite obviously ads.

What of the strange new world of viral marketing where the line between entertainment, advertisement, and meme blur into one fantastic mess? Recently an episode of “Dr. Who” was leaked online. The word was that it was actually distributed to hype the series. Thousands of people downloaded and watched the episode. And surprisingly enough, the show was pretty solid. I’ve never been much of a “Dr. Who” fan myself, but if the Sci-Fi channel aired it, I’d probably watch a few episodes of this new season.

Ironically, despite the rumors that this was not a viral marketing case, it was actually an insider pirating the material. I suspect that in the next year we’ll start to see more and more cases of material placed online for the purposes of advertising without the intentions being immediately clear.

We’ve seen it before. Buddy Lee jeans did this in the past. The company created a series of commercials and with them corresponding Web sites for the characters. These were distributed via word of mouth. Many people read these strange little Web pages without really being told what they were.

The Internet creates a sort of reality distortion field between the content generator and the content reader. When you watch a TV station, you at least can be reasonably assured that it went through certain procedures before it reached your eyeballs. You know that it was vetted for dirty words and approved by someone somewhere. This gives you a certain level of quality control, in exchange for what really is a form of censorship.

Online, this is gone. You don’t have a buffer. All dot coms are interchangeable on this level from vanity domains to the home page of *The New York Times*. All that each site has is its own integrity, and the individual is meant to sort it out.

But the entertainment world has blurred these lines before with scandalous results. There needs to be a church and state type separation between advertisers and entertainment online in the same way as there needs to be in any other medium. It’s just that online it’s completely unenforceable. Even if I adhere to strict policies on my Web page, there’s no reason anybody else has to.

Ultimately the consumer is the one who suffers. Already almost everything online is sponsored, advertised, and endorsed by some entity and relatively little of it is disclosed. Other media has dealt with this problem, but as we’ve seen already, the Internet truly puts the power in the hands of the people. It also puts the power in the hands of corporations who pretend to be people. Keep your eyes wide open. ▲

Throw your 2 cents in at malda@cpumag.com.

Forward Slash

SpyNet™

by Joan Wood

If you've recently tuned in to your work PC and found a tiny orange-and-yellow icon resembling something between a bull's eye target and a hockey puck, you're probably on your way to a close encounter with Microsoft Windows AntiSpyware (Beta), which is not at all a bad thing. After Giant Company Software was acquired by the real giant in Redmond last December, Microsoft vowed to release an anti-spyware beta product within a month and actually did just that (www.microsoft.com/athome/security/spyware/).

Even if you don't really care who tags along while you explore the info-super-net, the accompanying browsing slowdown is more annoying than a Broadway-show-tune-singing virtual hitchhiker and potentially just as dangerous. We first started harping about spyware awhile back ("WhenU Surf," November 2003 *CPU*, page 84) when it was mostly advertisers trying to figure out what they really ought to be trying very hard to sell to you. Now it's much more ominous.

With the tremendous increase in the use of online bill paying and banking services, certainly two of the fastest-growing Internet activities that don't involve images of unclothed iguanas, going along for the ride got to be quite a lucrative business for the bad guys; and thus, protection against that kind of misuse of your private info became a reasonable business model. How long that can continue now that Microsoft is offering the service free is another matter.

The Downside

As with many service markets that Microsoft chooses to enter in a big way (often by acquisition, with free support and lots of infrastructure), anti-spyware software development may soon suffer from a shortage of independence along with diminished funding sources. Why compete with a free downloadable product offered by the largest software provider in the world when you could invent a cure for oxygen or something simple like that?

Besides that, it is pretty much all good. Early reports have pegged Microsoft's product as reasonably effective, and very large numbers of consumers are voting with their mouse buttons by downloading and installing the software. Microsoft also seems to have learned a thing or two about marketing new features (perhaps from the Windows XP SP2 firewall nonevent), and adoption is sweeping through some of the large, tech-savvy corporations you would definitely recognize if named. There is another added nifty bonus: community involvement.

SpyNet

You can be a good Internet citizen by volunteering to become part of an automatic spyware reporting club called SpyNet, "a network of computer users, like you, who have agreed to forward information about spyware. . . . These reports are used to update the spyware detection signatures. Together, SpyNet subscribers create a vast anti-spyware community." Isn't that nice? Your involvement can make a difference, getting suspicious programs classified as spyware.

"Any user can choose to join SpyNet and report potential spyware to Microsoft. Users participating in the global SpyNet network help to discover new threats quickly, so everyone is better protected. Signatures are created for programs that are identified as spyware and made available to all users." Now your computer is an Internet Hall Monitor, issuing pink tardy slips and sucking up to the vice principal.

Real-Time Security Agents

The marketeers may have gone overboard to paint anti-spyware as sexy and compelling, but you can imagine little bits of code sporting Oakleys and dark suits that "monitor your computer at specific checkpoints. If these are breached, the activity is immediately analyzed against a database of known file and setting signatures. Security Agents block known spyware threats from installing or making changes, and prompt you to make the decision in other cases." If it weren't free, it would be priceless.

Other security tools in the Microsoft arsenal have equally enticing names. The Malicious Software Removal Tool for Windows XP, 2000, and Server 2003 is my current fave. Used for particularly nasty outbreaks and updated on the second Tuesday of each month, this tool warrants that classic link at the top of the www.microsoft.com/security/malwareremove/ page: "Skip the details and run the tool." ▲

Send Ray-Bans to joan@cpumag.com.

As founder and president of indy game developer Mango Grits, she talked 3Dfx out of prerelease Voodoo hardware to develop flying game Barrage for Activision then co-founded and ran hardware review site SharkyExtreme.com as managing editor. She currently plays with small, wearable PCs and big, rack-mount visual simulation image generators for Quantum3D while secretly plotting to save the world through a series of international location-aware multiplayer handheld games.

Why compete . . . when you could invent a cure for oxygen . . .

Quietly Setting A Whole New Standard.

Experience the unmatched combination of noise reduction and audio performance of our QuietComfort® 2 Acoustic Noise Cancelling® headphones.

Unwanted noise is everywhere. The engine roar inside an airplane cabin. The blaring sounds of city streets. The annoying din of the office. Bose® QuietComfort® 2 Acoustic Noise Cancelling headphones help you hush them all. Put them on and slip into a safe haven – where you can relax and enjoy peace and solitude or listen to your favorite music.

Proven Noise Reduction Technology.

Our original noise-reducing headphones were designed primarily for airplane travelers. But owners soon started telling us how much they enjoyed using them in other places. So we designed our QuietComfort® 2 headphones around the same patented technology that electronically identifies and dramatically reduces noise, while faithfully preserving the music, movie dialogue or tranquility you desire. The *Philadelphia Daily News* says that "Even in the noisiest environment, wearing these phones creates a calming, quiet zone for easy listening or just snoozing."

Our Best Sound Ever.

QuietComfort® 2 headphones deliver the best audio performance we've ever developed for headphones. Highs are impressively crisp and clean. Lows are deep and enveloping. Vocals are reproduced with lifelike authenticity. When audio critic Wayne Thompson heard our QuietComfort® 2 headphones, he reported, "Bose engineers have made major improvements." Whether you're looking for noise reduction or high-performance headphones for music, we think you'll agree – QuietComfort® 2 headphones capture the essence of serenity and sound.

Enhanced Comfort and Portability.

Respected columnist Rich Warren says, "The QuietComfort 2 lives up to its name, enveloping you in blissful sound in the utmost comfort. It's easy to forget they're on your head." To enjoy peace and tranquility, simply turn them on. To add Bose quality sound, attach the included audio cord and connect them to a home stereo, laptop computer, portable CD/DVD/MP3 player or in-flight audio system. When you're done, their convenient fold-flat design allows for easy storage in the slim carrying case.

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We don't expect you to take our word for how dramatically our headphones reduce noise, how clean and full the music sounds or how comfortably they fit. So we invite you to try them for 30 days, risk free. If you can live without them, return them for a full refund. Call today and ask about our new payment plan, which allows you to use your own major credit card to make **low monthly payments,** with no interest charges from Bose.

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ROAD Warrior

by Jen Edwards

Nokia's "Zen" Cell Phone, MSpot's Radio, Sony's Network Walkman, Samsung's NEXiO XP40 & More From The Mobile Front

Nokia Announces New "Zen" Handset

Nokia recently released information about its 8800, a new, high-end, tri-band, GSM mobile handset. Inspired more by modern watch-making techniques than typical mobile technology, the phone features a stainless steel casing and an ultra-sleek design. For example, the keys on the keypad are fabricated with injection-molding technology, and the display is made of a specially treated scratch-resistant glass that's more commonly used in luxury watches. The keypad also slides out of the phone's protective housing, and there's a camera on the back that is fully protected when the keypad isn't extended.

Nokia describes the construction of the phone as a "Zen-like goal to balance form and functionality," with the chief principle of designers and engineers being "to create a truly modern mobile phone, the epitome of style and elegance, which would be a pleasure to use and a delight to behold."

To push the theme even more, Ryuichi Sakamoto, an award-winning musical composer, was hired to create the phone's system alerts and ring tones, which add to the level of elegance that Nokia is evidently aspiring to with the design. Sakamoto reportedly took as his inspiration the idea that true "world citizens" who are constantly on the move would be using the phone. The Nokia 8800 is expected to ship in Europe in Q2 with a suggested retail price of about $970. Nokia has also announced a similar model, the 8801, for the U.S. market. It's expected to ship in Q3, but pricing details haven't yet been released. ▲

Nokia designed its new 8800 cell phone to be stylish and innovative, with a stainless steel housing and a slide-out keypad being two such features.

Samsung's NEXiO XP40

Samsung showed a prototype of its next mobile device, the NEXiO XP40, at CeBIT in Germany in March. In many ways the NEXiO is a cross between a tablet PC and a more traditional handheld, as it includes many of the features of both in a portable package. The device features a five-inch touchscreen with 800 x 600 resolution and Wi-Fi wireless networking. The XP40 runs on Windows CE .NET 5.0, the Microsoft operating system designed for low power consumption on portable devices. The XP40 also features an Intel PXA270 520MHz processor, 128MB of RAM, 128MB of flash ROM, a CompactFlash slot, and USB support. Bundled applications include Pocket Outlook, Windows Media Player, and MSN Messenger. Pricing details hadn't been released at press time. ▲

Sony's New 20GB Network Walkman

In what could prove to be an interesting new competitor to the iPod, Sony has announced the NW-HD5 Network Walkman. Roughly the same height and width as a credit card, the 125-gram device includes a 20GB hard drive (about 13,000 tracks) and a user-replaceable battery that's designed to provide 40 hours of playback on a single charge. The player will support both MP3 and proprietary AAC/ATRAC3 playback, and Sony is expected to bundle a copy of its SonicStage 3 software. The Network Walkman will also have a "follow turn" feature, which enables the display to move from a horizontal to vertical orientation as you turn it. The NW-HD5 will initially be available in Europe in red, silver, and black. A special limited-edition version with a 30GB hard drive has been announced, but no additional details were available at press time. ▲

MSpot's new satellite-quality Radio service lets you listen to 13 channels of music and programming on a Sprint PCS phone.

MSpot's New Mobile Phone Entertainment

In more mobile phone news, MSpot, a newer company on the mobile entertainment scene, recently announced its first service and also provided a few hints about future offerings. The company's MSpot Radio service provides 13 streaming and on-demand satellite-quality radio stations. Listening options include everything from today's hits to pop, country, classic rock, and hip-hop/R&B. News alerts, stock updates, talk radio, and weather forecasts are also available from National Public Radio, *SportingNews*, MarketWatch, the Associated Press, and AccuWeather. MSpot Radio is available for $5.95 a month on the Sprint Nationwide PCS Network and is compatible with the Sanyo MM-5600 and MM-7400 phones.

MSpot has also announced plans to bring other entertainment options to mobile phone users, including streaming video, motion pictures, and exclusive mobile content through partnerships with movie studios and other entertainment companies. More information is available at MSpot's Web site. ▲

Palm Data To Your iPod

We all know the iPod is a superb music player, but many people don't know that it can also serve as a basic information management device. Although it doesn't have all the bells and whistles of a Palm OS or Windows Mobile handheld, it is possible to export calendar and contact information, as well as memos, to an iPod. The process used to be somewhat complicated, though. Sappenin's new PalmPod application for Windows should help with this, however.

PalmPod, now a free beta download, simplifies the export process by using Palm Desktop for Windows as a conduit. Datebook, Address, Contact, and Memo are supported, and you can select the categories of information you want to export in order to save space on your iPod. You can also choose to export entries you've marked as private on your Palm OS device because the iPod doesn't offer any security or password-protection features. Other PalmPod features include support for multiple phone numbers, custom fields for contact records, the ability to set a date limit for Datebook entries, and Unicode output that creates readable records for any language the iPod supports. Sappenin is already at work on an upgrade and is soliciting user feedback about what features and changes they desire. For more information or to download the beta, go to www.sappenin.com. ▲

Compiled by
Samit G. Choudhuri & Chris Trumble

At Your Leisure

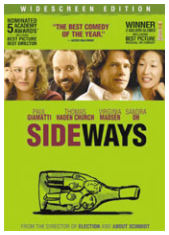
Here's a hands-on look at some of the most interesting releases that we've personally checked out right as we were going to press. Visit www.cpumag.com/cpujun06/ayl for a more in-depth look. (You're right, it's a difficult job but someone's gotta do it. Movies by Samit and music by Blaine Flamig.)

AV Corner

$27.95
New Line
www.primermovie.com

Primer

"Primer" was made for $7,000 and puts many recent multimillion dollar productions to shame. The entire editing process was done on a home PC (which means we all have the tools). It is one of the most intriguing, intelligent, and well presented sci-fi films I've seen in a long time. Aaron (writer/director/cinematographer Shane Carruth) and Abe (David Sullivan) are tech guys who spend their days working in corporate America and all the rest of their free time inventing out of Aaron's garage. Quite by accident they develop a device that gives them unimaginable power. Watch it with a bunch of your friends and then grab dinner and drinks afterward—you'll have plenty to discuss.



$29.95
Fox
www2.foxsearchlight.com/sideways

Sideways

Local lad Alexander Payne (director/screenplay) hails from nearby Omaha, Neb., and has put out several superb films in recent years such as "Election" and "About Schmidt." "Sideways" is his most well-rounded drama and is, unusually, a "guy's" film without the usual gratuitous action sequences. Miles (Paul Giamatti) and Jack (Thomas Haden Church) head to California wine country for Jack's last week as a bachelor. Both men grow up fast on the trip thanks to utterly believable performances from Virginia Madsen and Sandra Oh.

$20 (DVD)
Palm Pictures
www.digthemovie.com

DiG!

Want to be a rock star? You might rethink things after witnessing "DiG!," a documentary seven years in the making that's as fascinating and disturbingly engrossing as anything we've seen in years. If you know your indie music, you might already know the Dandy Warhols or the Brian Jonestown Massacre. Even if you don't, Ondi Timoner's gritty, dirty, and sometimes-awful look at two bands similar in style but different in execution is a train-wreck spectacular.

$12
Geffen Records
www.garbage.com

Garbage—"Bleed Like Me"

Butch Vig, Garbage's drummer/producer extraordinaire, quit Garbage during the recording of "Bleed Like Me"—the band's fourth album and first in four years—only to return four months later. Good thing for us. "Bleed's" 11 power-pop tracks are full of out-front distorted guitars, heady drum work, techno splashes, and, of course, the smart, sexy, and tough Shirley Manson, possibly our favorite woman in rock. Given enough listens "Bleed Like Me" stabs clean and true.

See the full reviews from A/V Corner at www.cpumag.com/cpujune05/AYL

DVD Byte

May 3, 2005

National Treasure
Spaceballs
The Phantom Of The Opera
Pocahontas
(10th Anniversary Edition)
King Of The Hill:
The Complete Fourth Season
Star Trek Enterprise:
Complete First Season

May 10

In Living Color:
Season Three
The Life And
Death
Of Peter Sellers
The Life
Aquatic With
Steve Zissou

May 17

Assault On
Precinct 13
Kinsey
Scrubs:
Complete First
Season
Six Feet Under:
The Complete
Third Season
The Steve
McQueen
Collection
Team America:
World Police
White Noise

May 24

Chappelle's
Show
Uncensored:
Season 2
Samurai Jack:
Season 2
Rebel Without A Cause
(Special Edition)

Tom Clancy's Splinter Cell Chaos Theory

BRING THE BATTLE CLOSER...

Hello Darkness, My Old Friend

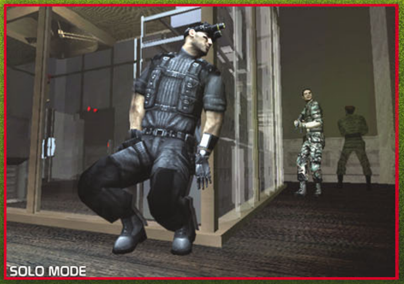
Let's make this simple for you: If you enjoyed the previous Splinter Cell games, you may as well skip this review and go straight to your local software store. This game won't change your mind if the previous iterations were just not your bag.

You'll play this game for its single-player campaign, which is set in 2007 and focuses on a tense situation involving the United States, Japan, and Korea. You'll be doing more of the same in the realm of high-tech, stealthy espionage. However, this time you have even better locations and more choices. Based on the previous titles, it should go without saying that the graphics are superb. Your alter-ego, Sam Fisher, now also has more options availably to him when taking out the enemy. Not only do you have more choices of attack, but a slew of new weapons and gadgets. AI is still average (especially when compared to games such as Halo 2 and Republic Commando), but is passable enough to make gameplay enjoyable.

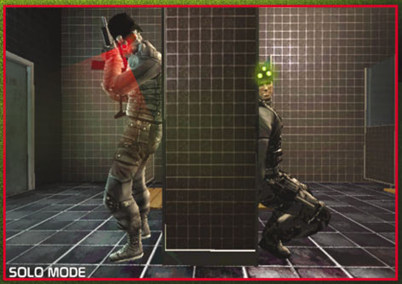
Darkness is your friend and stealth is your ultimate tool, but being able to exercise more options to either eliminate or circumvent the enemy makes for the most entertaining Splinter Cell game yet. Some people just don't care much for stealth gaming—even if it is the best in its genre. For those of you with both a PC or an Xbox, this third release of Splinter Cell looks best on the PC, but features a better multiplayer experience on Xbox. (The co-op mode is fantastic.) ▲

$49.99 (PC, Xbox, PS2, NGC) • ESRB: (M)ature

Ubisoft
www.splintercell.com



SOLO MODE



SOLO MODE

BROTHERS IN ARMS ROAD TO HILL 30

A Triumph In WWII Gaming

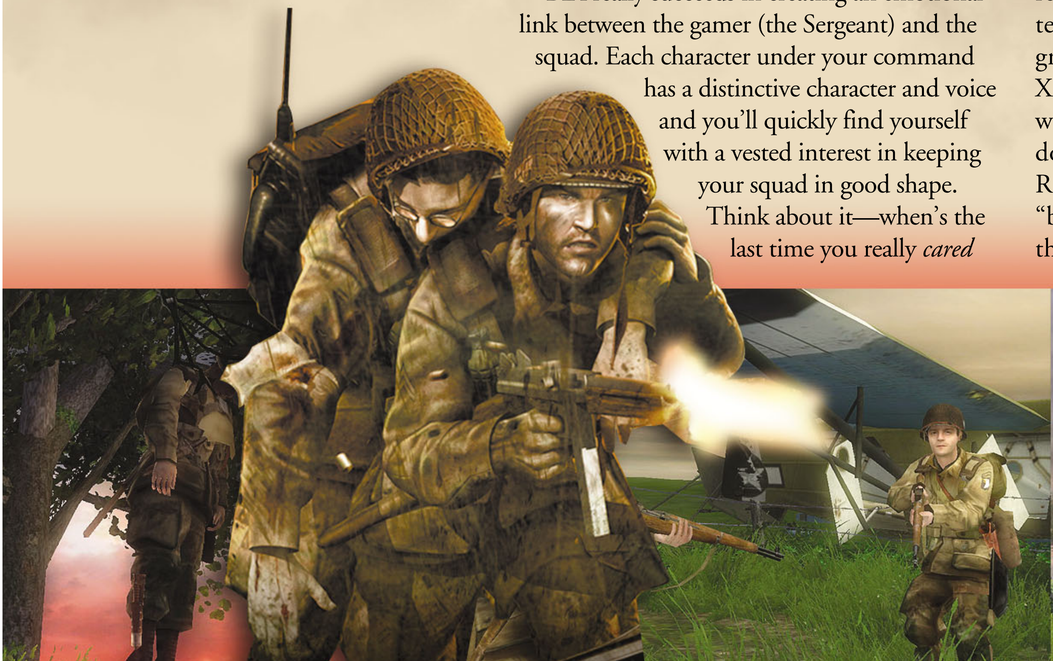
$49.99 (PC, Xbox, PS2) • ESRB: (M)ature

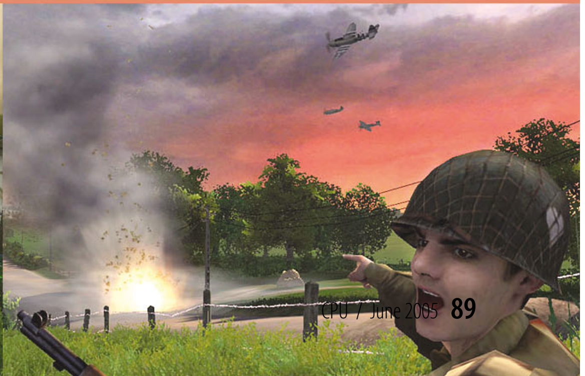
Ubisoft
www.brothersinarmsgame.com

We've not exactly experienced a dearth of WWII FPSes in the past few years, but a great game is a great game—even if it does tack WWII again. Brothers In Arms is based on Matt Baker, a real-life Sergeant in the 101st Airborne Division. (Even the terrain was modeled from aerial photographs taken during the war.) Anyone that's seen "Saving Private Ryan" and "Band Of Brothers" will immediately see the cinematic influences integrated into the taut gameplay.

BIA really succeeds in creating an emotional link between the gamer (the Sergeant) and the squad. Each character under your command has a distinctive character and voice and you'll quickly find yourself with a vested interest in keeping your squad in good shape. Think about it—when's the last time you really *cared* about the well being of characters in an FPS? For many games this would be the coup de grace, but in BIA it's just one of many highlights because the actual gameplay is absolutely top-notch. We liked the situational-awareness mode where you can pause the game to better scope out your surroundings before issuing commands to your squad. The command interface is well thought out and works seamless in both versions of the game we played (PC and Xbox).

All the latest in-game special effects are represented along with detailed models and textures. We've got no complaints on the graphics because they looked solid on the Xbox. Audio is bang-on. The language is what you'd imagine if you were on death's door, so keep this one away from the kids. Really, this is the closest you can get to that "being there" feeling. Brothers In Arms takes the genre up a whole new notch. ▲





GOD OF WAR

The New Spartan On The Block

$49.99 (PS2) • ESRB: (M)ature

Sony Computer Entertainment America
us.playstation.com/Content/OGS/SCUS-97399/Site

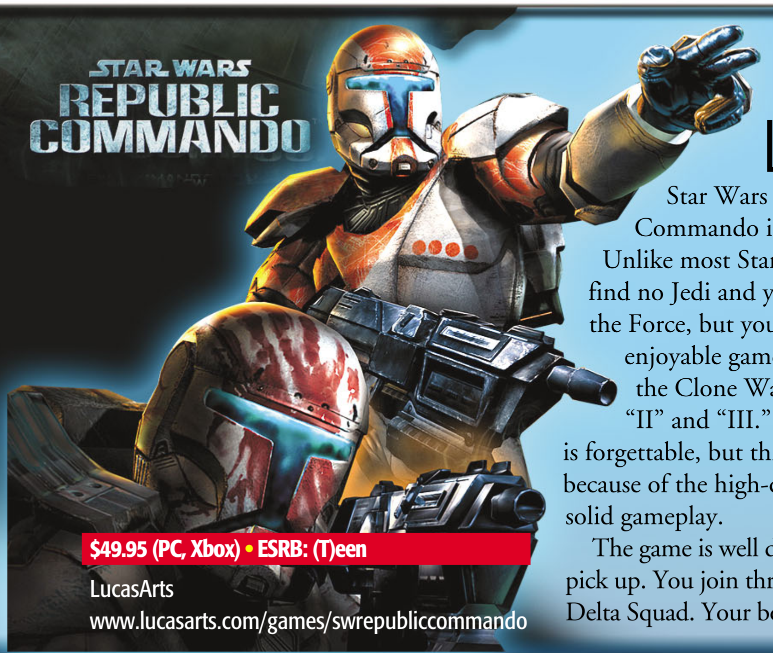
God Of War is a third-person action game set in ancient mythological Greece that tells the story of a Spartan warrior named Kratos who has been given a pretty tough job by the gods: He must kill Ares, the god of war. Why he needs to do this and who he is may not be apparent at the outset, but as you work your way through the game's excellent, dripping-with-atmosphere levels, you'll get more of the argument via the occasional CG movie scene. The story is dark and compelling, and Sony doesn't skimp on the production values—narration by Linda Hunt ("Dune," "Dragonfly," etc.) is especially effective and lends the game a nice, cinematic touch.

GOW has some adventure elements, in that it features a number of interesting puzzles and also allows for the development of Kratos' powers over time as you gain experience. But the real draw here is action; Kratos uses his Blades of Chaos (twirling, blazing swords attached to Kratos' arms by long chains) to slice and dice his way through wave after wave of nasty, ugly (but beautifully rendered) servants of Ares. Centaurs, minotaurs, and other various creatures from Greek mythos are out to stop you, but thanks to excellent controls and smooth, intuitive combo attacks (not to mention special contextual attacks available when button symbols appear above your foes), you're well equipped to deal with them. You'll also have access to mighty powers you receive from the gods over time. That's not to say the game is overly easy; you'll often find yourself outnumbered and will need to stay on your toes to survive.

Not all the game's boss battles are created equal, but for the most part they add quite a bit, and like everything else, they look incredible. In fact, God Of War is as impressive visually as it is dark and brutal, and that's saying a lot. ▲

STAR WARS REPUBLIC COMMANDO

Squad Control Beats Schwartz Control



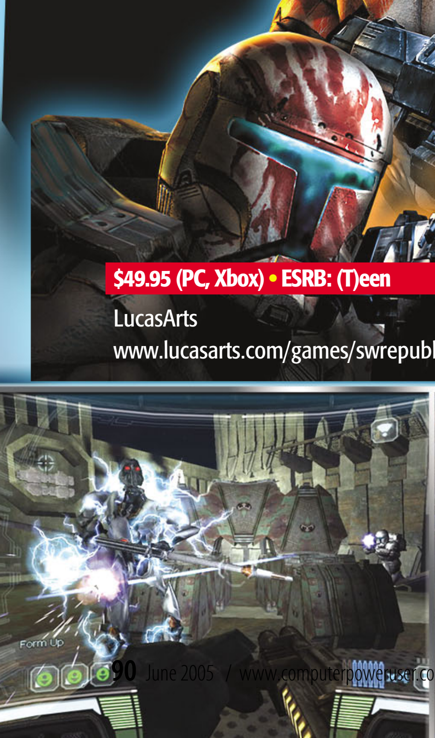
$49.95 (PC, Xbox) • ESRB: (T)een

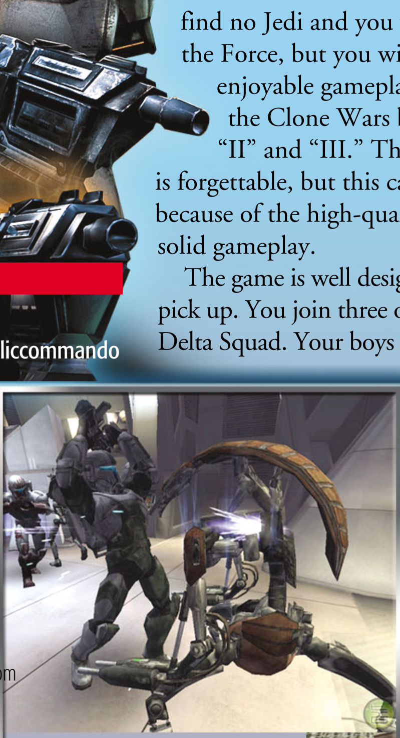
LucasArts
www.lucasarts.com/games/swrepubliccommando

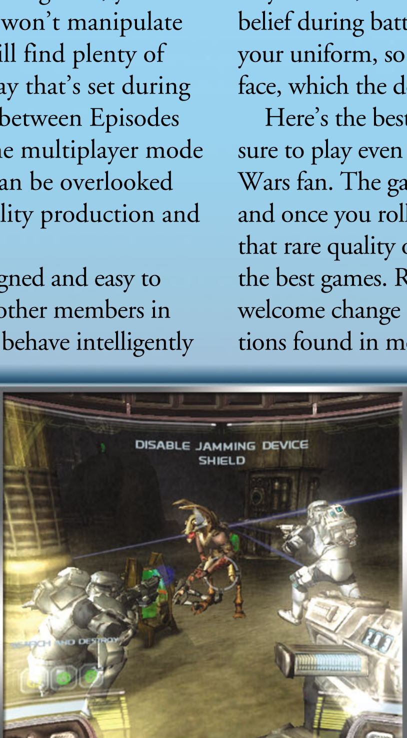
LucasArts has had many flubs with the Star Wars license but Republic Commando is quite the opposite. Unlike most Star Wars games, you'll find no Jedi and you won't manipulate the Force, but you will find plenty of enjoyable gameplay that's set during the Clone Wars between Episodes "II" and "III." The multiplayer mode is forgettable, but this can be overlooked because of the high-quality production and solid gameplay.

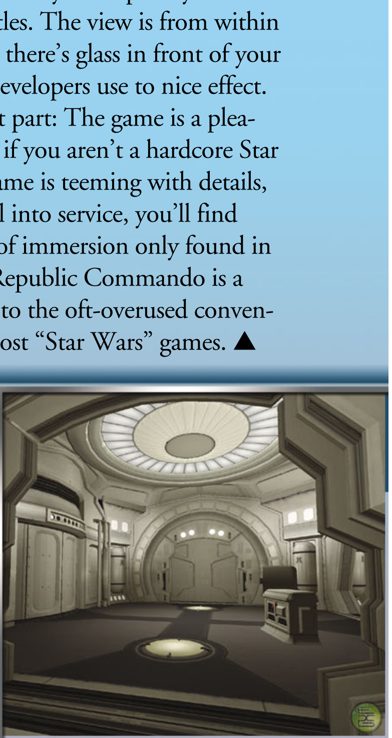
The game is well designed and easy to pick up. You join three other members in Delta Squad. Your boys behave intelligently and can take out enemies but fare best when you join in the party. This is not "real" squad gaming a la Rainbox Six and levels are pretty linear, but squad interaction and behaviour is very natural, so it's easy to suspend your disbelief during battles. The view is from within your uniform, so there's glass in front of your face, which the developers use to nice effect.

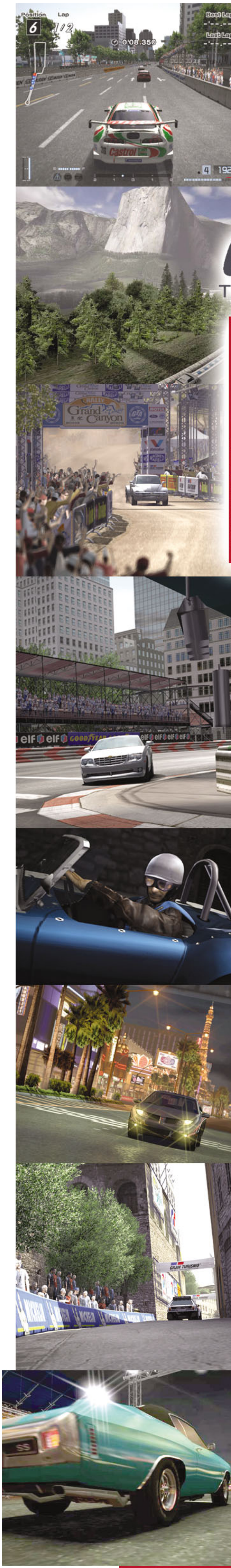
Here's the best part: The game is a pleasure to play even if you aren't a hardcore Star Wars fan. The game is teeming with details, and once you roll into service, you'll find that rare quality of immersion only found in the best games. Republic Commando is a welcome change to the oft-overused conventions found in most "Star Wars" games. ▲











GRAN TURISMO 4
THE REAL DRIVING SIMULATOR

Driving Gloves Sold Separately

Simply put, Gran Turismo 4 is the purest, most realistic driving experience you can have on a game console today. Of course, depending on what you're looking for in a game, that can be either bad or good. If you're into arcade-like, physics-defying handling and/or over-the-top crashes a la Burnout 3, GT4 probably isn't for you. But if you'd like a little taste of what it's like to push (for example) an Aston Martin Vanquish to its extreme limits, or if you want to brush up on real-world, high-performance driving techniques, pay the man and buckle up.

Polyphony Digital and Sony packed GT4 with a flat-out amazing selection of cars (more than 650 cars and trucks from 80 marques around the globe), and every one of them handles, looks, and sounds just as it should. You can drive this plethora of cars on a variety of track types and in several game modes. Arcade Mode lets you pick a car, pick a track, and hit the road, which is a very cool way to try out all your new rides. Gran Turismo Mode is a very different experience, but is possibly even more addictive; you start out with just enough cash to buy a modest, entry-level car and you have to earn money for new ones (and/or to tune the car you have) by winning races. Race your friends with LAN Play Mode, manage a race in B-Spec Mode, or hit Photo Mode and snap photos of your favorite cars in exotic locations. (You can even print your pics with a USB printer.)

$49.99 (PS2) • ESRB: (E)veryone
Sony Computer Entertainment America
www.granturismo4.com

We have to admit we missed having cars that model crash damage—sorry, Polyphony, we're not completely grown up yet—but in every other respect, Gran Turismo 4 is a car nut's dream. ▲

Logitech Driving Force Pro

Most gamers would agree there's no substitute for a good force feedback steering wheel when you're playing a driving game. Sony partnered with Logitech on the Driving Force Pro, custom designed for use with Gran Turismo 4, and we like the results.

The wheel and pedal set is solidly built, responsive, and precise. It's not exactly an impulse buy at $150, and setup takes long enough that you won't want to set it up and pack it away too often. But if you want to take the GT4 experience as far as it can go, the Driving Force Pro can take you there. ▲

$149.99 • Logitech
www.logitech.com

WinXP Tip Of The Month

The Processes tab of the Windows Task Manager reveals all of the active services that Windows is running in background, but it's often hard to tell which of these is vital to Windows' functioning and which are installed by third-party software. The easy way to see the difference is to open the much-ignored System Configuration Utility. Click Start, select Run, type **msconfig** in the Open field, and click OK. Next, click the Service tab and check the box labeled Hide All Microsoft Services, and the list will show only third-party services running in background. ▲

Registry Tweak Of The Month

Microsoft Office has a Clipboard toolbar that pops up whenever you copy more than one block of data and lets you choose which clip to paste. In many cases this is more of a bother than a help because we usually copy and paste one block at a time. You can disable the pop-up option box at the Registry key HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\OFFICE\XX.X\COMMON\GENERAL, where *XX.X* is a variable version number for the iteration of Office that is installed on your system. Look for the Value named AcbControl. Change the Value Data to 1 to prevent the Clipboard toolbar from appearing and 0 to re-enable it. ▲

SOFTWARE TIPS & PROJECTS

Remote Control Freaks

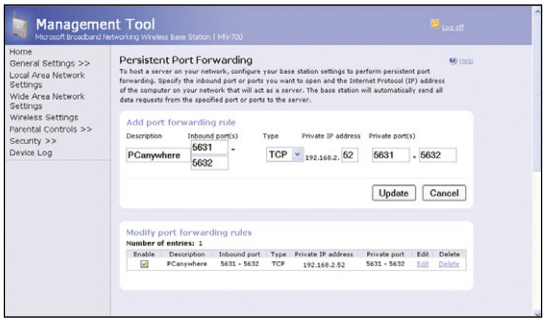
Once you use remote access software, such as Symantec's pcAnywhere or Citrix's GoToMyPC, you may never have to worry about the files and contacts you forgot to load onto your PC or PDA for that road trip. In *CPU*'s April 2005 roundup of remote access software (pages 76 to 78), these two rated highest, and deservedly so; they let you run your main PC (commonly called the "host") via an Internet connection from anywhere. Un-fortunately, in order to work for your benefit, some remote control programs need to access your PC in ways that most home routers and desktop firewall programs are meant to prevent, so they can be maddening to set up. This month we walk you through some tougher aspects of setting up pcAnywhere, as well as how to optimize and make best use of both Symantec's standalone program and Citrix's Web-based subscription service.

Being A Welcome Host

We won't reiterate the installation of host and remote software, but we can highlight the clutch points common to network users of remote access software. Internal networks present a special challenge because the control program must navigate a path through your router and to the specific machine you want to control on that router's network. For instance, in order for pcAnywhere to work via the Web, it must know your router's IP address. First, access the administrative interface on your router (see router instructions) and write down your WAP IP Address.

You'll also need to know the IP address the router uses to communicate to the specific PC you want to control: the host that is also running pcAnywhere. From the host PC, click Start, select Run, type **command** in the Open field, and then at the C: prompt, type **ipconfig.** You'll see the host PC's IP address in the first line.

Remote access software controls your PC through specific ports. In the case of pcAnywhere, the ports are numbered 5631 and 5632. Calls from a remote PC come to the router on these ports, and you need to "map" those calls at your router to those same ports on the host PC in your network. Access the router's administrative interface (see the manufacturer's instructions) and find the function for port forwarding. In this window enter a rule named **pcAnywhere** and enter the Inbound Ports as **5631-5632**. The Type of access is TCP, and in Private IP Address, enter the IP address of the host PC on the network (in this case 192.168.2.52). We also put into this entry the ports 5631-5632. Every router manufacturer locates and labels these



Persistent Port Forwarding

To host a server on your network, configure your base station settings to perform persistent port forwarding. Specify the inbound port or ports you want to open and the Internet Protocol (IP) address of the computer on your network that will act as a server. The base station will automatically send all data requests from the specified port or ports to the server.

Add port forwarding rule

Description	Inbound port(s)	Type	Private IP address	Private port(s)
PCanywhere	5631 - 5632	TCP	192.168.2. 52	5631 - 5632

Modify port forwarding rules

Number of entries: 1

Enable	Description	Inbound port	Type	Private IP address	Private port	Edit	Delete
☑	PCanywhere	5631 - 5632	TCP	192.168.2.52	5631 - 5632	Edit	Delete

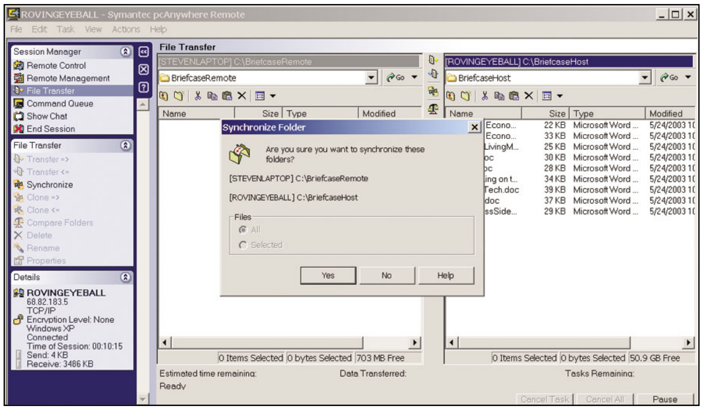
In order for pcAnywhere to control a PC outside a home or office network, the network's router must "map" the controlling software's calls to certain ports to the specific IP address of the PC being controlled on the network.

functions a bit differently, but most will follow a similar approach in mapping the remote PC's port calls to the right ports on the right PC in your network.

The subscription-based GoToMyPC doesn't require this sort of tweaking because this service uses a Web site to access your PC through the same ports it already uses to communicate with the Internet. Citrix's Web service approach does give you ease of use, but you pay a monthly fee. Symantec's pcAnywhere is a standalone program that you buy outright.

A Hole In The Wall

Remote access programs usually automatically create an exception in your PC's firewall that allows the host program to pass control of your PC to a remote PC. In most cases your host's firewall will detect the remote PC's first attempt to access your system and ask you to grant permanent permission for these programs to communicate with one another. If this doesn't happen, you may need to set firewall exceptions manually. If you have adjusted settings to your router, and the remote pcAnywhere program still can't access your PC, then temporarily disable your host's firewall to see if this is the problem. In Windows XP SP2, open the Security Center in the Control Panel and click Windows Firewall at the bottom of the window. Toggle the firewall off, click OK, and try the remote access again.



ROVINGEYEBALL
68.82.183.5
TCP/IP
Encryption Level: None
Windows XP
Connected
Time of Session: 00:10:15
Send: 4 KB
Receive: 3486 KB

[STEVENLAPTOP] C:\BriefcaseRemote

[ROVINGEYEBALL] C:\BriefcaseHost

Synchronize Folder

Are you sure you want to synchronize these folders?

[STEVENLAPTOP] C:\BriefcaseRemote

[ROVINGEYEBALL] C:\BriefcaseHost

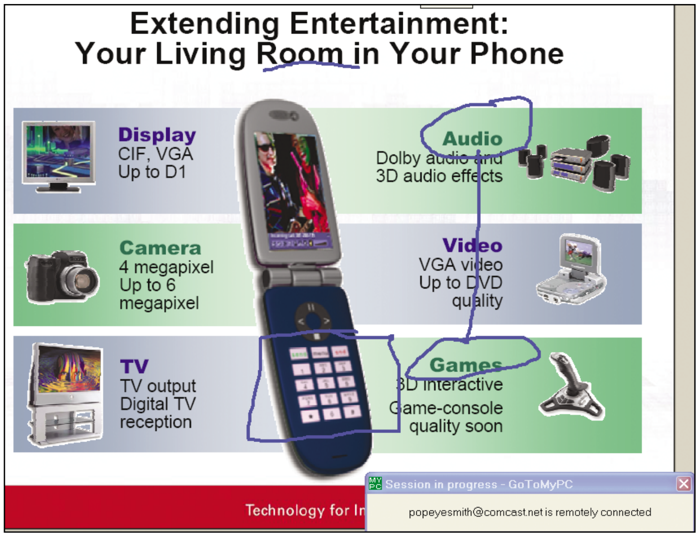
Files
● All
○ Selected

0 Items Selected | 0 bytes Selected | 703 MB Free

0 Items Selected | 0 bytes Selected | 50.9 GB Free

Estimated time remaining: Data Transferred: Tasks Remaining:
Ready

With pcAnywhere you can synchronize files or entire directories between a remote and host PC.



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Up to D1

Audio
Dolby audio and
3D audio effects

Camera
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Up to 6
megapixel

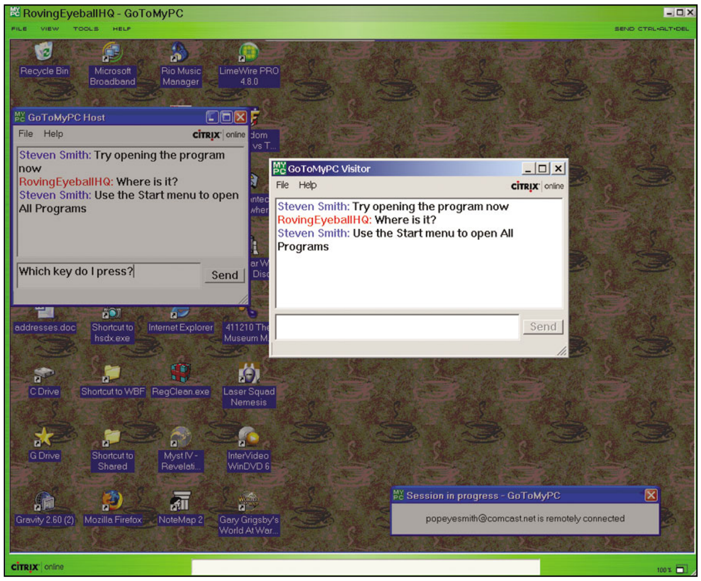
Video
VGA video
Up to DVD
quality

TV
TV output
Digital TV
reception

Games
3D interactive
Game-console
quality soon

Technology for In

Session in progress - GoToMyPC
popeyesmith@comcast.net is remotely connected



Steven Smith: Try opening the program now
RovingEyeballHQ: Where is it?
Steven Smith: Use the Start menu to open All Programs

Which key do I press?

Steven Smith: Try opening the program now
RovingEyeballHQ: Where is it?
Steven Smith: Use the Start menu to open All Programs

Session in progress - GoToMyPC
popeyesmith@comcast.net is remotely connected

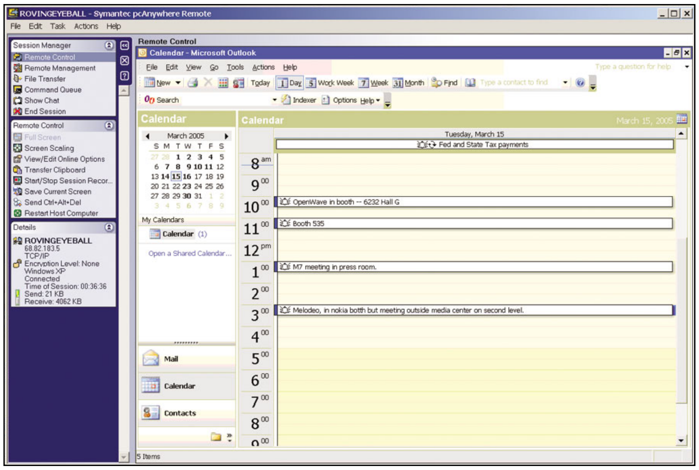
You can use GoToMyPC to give instructions or demo a program on another person's PC while he watches on his Desktop.

If it turns out that the firewall is blocking pcAnywhere's remote access, return to the Windows Firewall window and turn the firewall back on. Now use the Exceptions tab and click Add Program. You need to find the executable program that runs the host PC. Highlight it and keep clicking OK to close out all the menus. You may also have a secondary firewall running, and you'll need to use that program's specific routines for making exceptions. Some of these firewalls may just ask you to name the program you allow through, but others might need you to specify which ports this program is allowed to access. In this case remember that you need to let the 5631 and 5632 ports through.

For GoToMyPC, you need to make exceptions on the host PC for g2com.exe, g2fileh.exe, g2host.exe, g2mainh.exe, g2printh.exe, g2svc.exe, g2tray.exe, and gopcsrv.exe, all of which are in your PROGRAMS\CITRIX\GOTOMYPC folder.

Remote Optimization

Remote access programs are pushing enormous amounts of screen information through your broadband connection, so the performance on the remote end of the connection depends on the bandwidth loads on both machines, and especially on the upstream rate of your broadband connection on the host end. You can improve the responsiveness of your connection by ending all programs on both PCs that persistently access the Internet. Updating the screen image of the host PC accounts for much of the load, so simplify the host PC display. First reduce the host's display settings to 800 x 600. Also, change any desktop wallpaper to a solid color. You can do both of these tweaks on the fly from your remote PC by right-clicking the host PC's Desktop and accessing the Display Properties screen.



ROVINGEYEBALL
68.82.183.5
TCP/IP
Encryption Level: None
Windows XP
Connected
Time of Session: 00:36:36
Send: 21 KB
Receive: 4062 KB

Tuesday, March 15
Fed and State Tax payments
10 00 OpenWave in booth -- 6232 Hall G
11 00 Booth 535
1 00 M7 meeting in press room.
3 00 Melodeo, in nokia botth but meeting outside media center on second level.

The best use of remote access software is the most mundane—being able to retrieve all of that calendar and contact info you usually leave behind.

Transfer Files

You can't drag and drop files from your host PC to the remote PC; you must use the program's internal file transfer protocol. In pcAnywhere use the File Transfer tool (on the Session Manager bar) to bring up directories on your host and remote pc. All you need to do is highlight the files on one or the other PC and click the Transfer key to send the files to the other PC.

The really cool tool in pcAnywhere, however, is the Synchronize function, which synchs directories on both the machines with the latest versions of files you are working on. For this we suggest creating specific folders on both host and remote PCs. We made a BriefcaseHost folder on the host PC and a BriefCase-Remote on our laptop. We found that naming the folders helps minimize confusion when you have the directories side-by-side in the file transfer window. You can either highlight specific files you want synched to the latest versions or click the Synch button without files highlighted, which synchs the whole directory.

GoToMyPC also has a file transfer window (use the command in the Tools menu) but lacks pcAnywhere's synch function.

Cut & Paste Between PCs

Rather than pull entire files from a host to a remote PC, use a modified version of cut and paste on select blocks of text. From the remote PC, block the text you want in the host application and use the copy command. In pcAnywhere's Session Manager, activate the Transfer Clipboard command, in the pop-up window choose Transfer The Host's Clipboard To Your Clipboard, and click OK. Now you can open a program on your remote PC and paste the material into your own applications. We found that this works on most text blocks and highlighted images, but it doesn't work on files that you highlight in Windows Explorer and copy. For that you need to use the file transfer procedure mentioned earlier.

GoToMyPC has the more direct method, but it only works with text. Copy the text block inside the remote session window and just paste it into any application.

Demo A Program

Remote access lets you walk a user on the host end through a new program or actually demo the program on his desk-top. For instance, from the remote PC press the Windows key and tell the pcAnywhere prompt to send the command to the host. This brings up the Start menu on the host and lets you start and control any of that PC's programs. Use the Show Chat command in Session Manager to start a chat session with anyone at the host PC. This way you can demo a program to someone on the host PC and narrate what you are doing (and receive questions from the viewer) via a chat window.

In fact, you can combine the file transfer function with the demo function by transferring a program from the remote PC to the host PC, installing it remotely, and then demonstrating it to the user on the host PC end.

The host PC user can take back control of her desktop by using the mouse or keyboard, and then the person on the remote PC can watch what the host PC user is doing. In this way you can teach someone interactively how to use a program and let her experiment while you monitor her progress and send chat messages.

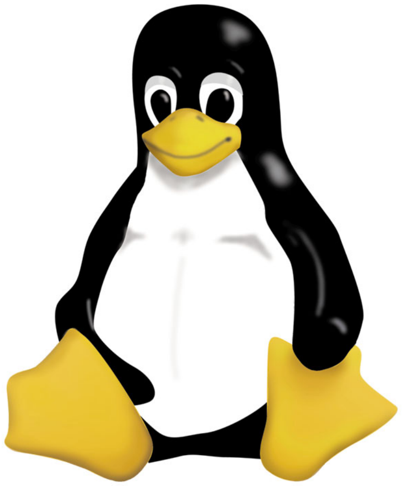
GoToMyPC has a unique Draw Mode that lets the remote user draw on the host PC's screen to highlight items or illustrate points. The drawing is a temporary overlay that disappears when you call up a different window or use the Erase Drawing command on the Tools menu.

Access Your Life

The best uses of remote access are actually unremarkable because the beauty of programs such as GoToMyPC and pcAnywhere is how they let you perform from afar all the mundane operations you usually do at your desktop. Not only can you manage and tweak your PC with remote access software, but you also can control a colleague's PC or just help him out. CPU

by Steve Smith

WARM UP TO PENGUINS



A Hitchhiker's Guide To Traveling With Linux

Some people spend more time on the road than they do at home. Other people just want to make sure they have everything they need when they need it for even a one-time trip, whether it's for business or vacation. Either way, Linux makes it pretty easy to set things up so that you can synchronize the information in your desktop and your laptop before you go and for when you return.

To begin preparing to do this, it helps to make sure that you are running exactly the same version of Linux (and that they are updated to the same level) on both machines that you are using. This isn't an absolute requirement, but some users like to have all their bookmarks, customization settings, and more at their fingertips no matter where they are. If you want to just synchronize your document folders or just bring a few parts of your usual environment with you, this will work, too.

No matter what data you want to synchronize, this whole effort hinges on using an open-source tool called rsync (samba.anu.edu.au/rsync).

Introducing rsync

Whether you want to keep Web and FTP mirrors fully synchronized or just run under the hood of your favorite backup program, rsync is an invaluable tool in any Linux user's tool belt. Think of rsync as the tar of the network copy world. With it, you can preserve all aspects of your file metadata, such as links, permissions, timestamps, devices, and various ownerships. Even better, rsync copies only the parts of files that have changed vs. copying entire files, thus speeding up transfer times immensely.

Because it is a good habit to make sure you are running such file-transfer tools securely, this article focuses on using rsync through SSH (Secure Shell), the secure telnet replacement. The following are some things to keep in mind before we proceed.

Your Linux distribution may or may not have installed and configured SSH clients (ssh) and servers (sshd) on each of your machines. If not, see your distribution's documentation for details.

The most recent versions of rsync use SSH by default. If your version doesn't, add the flag **-e ssh** to your command line sequence to activate the feature.

rsync is a command line tool. Some of the most popular flags include what you'll find in the "The Most Popular rsync Flags" chart with this article.

The flags shown in the "The Most Popular rsync Flags" sidebar are just the tip of the iceberg. It may be worth your time to type **man rsync** at a command prompt to learn more about rsync. Additionally, you don't have to use rsync over a network. You can use it to copy between locations on the same machine.

Once you have selected the flags you want, you need to decide where you are transferring from and where you are transferring to. You can specify either location in the format of user@host:path

You may not need all three elements. For example, if you are synchronizing your home directory on your desktop to the directory on your laptop (where the usernames are identical on both machines), you would not need the user component. Instead, you could use host:path. In addition, if you were running the command from the desktop, on the desktop you would only need the path component, while the part referring to the laptop would need host:path.

> **"Think of rsync as the tar of the network copy world."**

For example, let's say that your account is named bob. From bob's home directory on the desktop you might type:

```
rsync -avz /home/bob/ laptop:/home/bob/
```

The ending slash shown in the directory is important in the case of rsync. If you used the path rsync -avz /home/bob laptop:/home/bob instead, the data would be copied into the directory /home/bob/bob. For this reason, it is a good idea to use the -n flag when you're initially setting up a transfer to make sure that you're doing what you intend to do before you start actually moving files around.

rsync Strategies

How you handle your file movements will depend on a number of factors. If your laptop has a fresh install, you need to make sure not to use the update flag when transferring information from your desktop. Otherwise, not all of your desktop configuration will make it to your laptop because you probably set up your desktop before the laptop installation was installed. Thus, the desktop's files are older than the laptop's. When you return to the desktop, use the update flag, as your synchronization will be much faster this way.

You can take rsync one step further by using it to handle system backups. This will let you retrieve files from your backup server from anywhere over SSH and the Internet. Be sure that you use SSH if you're using rsync outside of your local network. You may not be too worried about people sniffing through the contents of every one of your files, but there are probably some that you would like to protect. Making security a habit is your best bet overall for keeping your data safe.

If you want to set up such a system, you may want to configure only certain sets of files and directories as able to transfer onto the backup. In this case you would add the combination —files-from=filename, such as:

```
rsync -avz —files-from=/home/bob/synclist laptop:/home/bob
```

Inside the file (synclist in this example), you specify one file or directory per line. So, synclist might contain:

```
/home/bob/Documents
/home/bob/.evolution
/home/bob/.mozilla
```

If you then wanted to make sure to exclude specific files from this backup, you could add the —exclude-from=file flag in the same way, creating a new file for the specific items to leave out. You can get as creative here as you need to. At a command prompt, type **man rscync** and search down through to find the formats for specifying file and directory patterns. If you don't know how to run a search in a man page, once you are in it, press the / key, type what you are looking for (in this case, type INCLUDE/EXCLUDE PATTERN RULES), and press ENTER. This will jump you down to the first instance. You can then press the *N* key to search for the next instance, and so on.

Start Packing

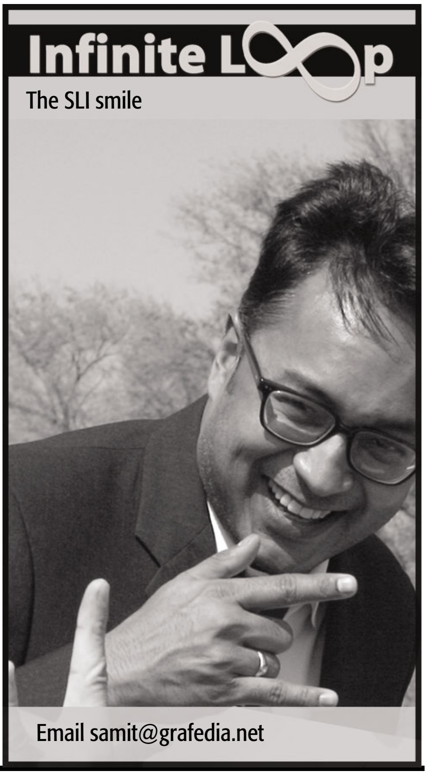
The rsync program is a popular synchronization tool that's not only used for keeping FTP and Web mirrors in line with the main sites they're copying, but also within the backup community. The tool is feature rich and can do far more than we can cover in this space. Be sure to type **man rsync** at a command prompt and take a look at what other options are available to you. You might just find a new favorite tool. In the meantime, you are now fully prepared to travel with far more ease. There's nothing quite like being able to tell rsync to transfer all your files and walk away to finish packing or unpacking.

by Dee-Ann LeBlanc

The Most Popular rsync Flags

Here is a list of some of the most popular rsync flags that are available to you and what they signify. In addition, you can learn more about rsync and other flags by typing **man rsync** at a command prompt.

Flag	Description
-a	"Archive mode" is a combination of flags, including -r (recursively copy), -l (preserving symbolic links), -p (permissions), -t (timestamps), -g (group ownerships), -o (file ownerships), and -D (devices)
--delete	Deletes files on the receiving side that don't exist on the sending side
-n	Doesn't transfer anything, but it lists what it would do if you did transfer certain files
-q	Suppresses most messages except error messages
-r	Recurses through subdirectories
-u	Only transfers updates
-v	Displays verbose information
-z	Compresses data before transferring



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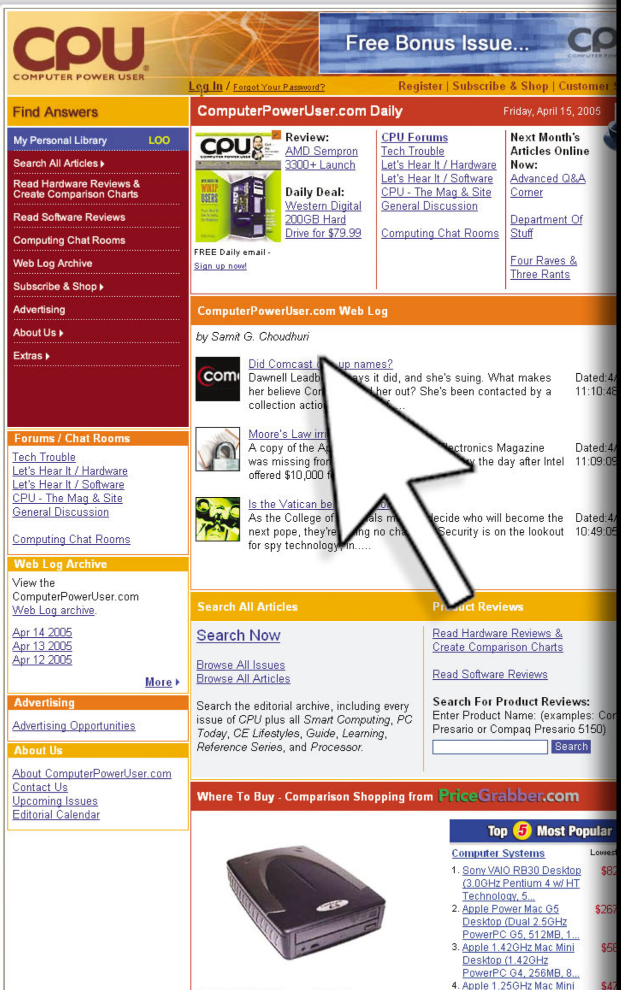

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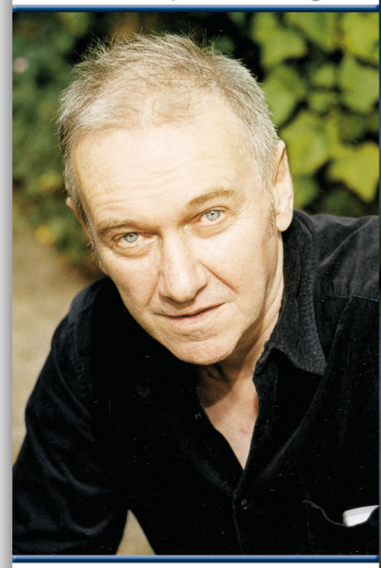
Software's The Key To Dual-Core Shift

by Mike Magee



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

Many reviewers and technical pundits think that on the performance side, AMD has a clear lead on Intel of 12 to 18 months with its desktop processors. To counter that Intel has a highly efficient manufacturing, sales, and marketing engine which continues to pull in big profits aided by a widespread business move to notebook chips.

In truth, the latest Intel roadmaps I've seen show that right up until the second quarter of 2006, there's little to excite anyone on the desktop front. Intel is already in a strong position to move from its current manufacture of processors from 90nm to 65nm. Like previous shifts, this results in greater economies of scale for Intel and will allow the company to stamp out more processors from each silicon wafer it makes. And because it's now producing bigger 12-inch wafers, Intel can make many more chips. But, unlike previous manufacturing shifts to a new CPU core, this isn't going to result in faster microprocessors. Instead, the highest clock speed for single-core desktop chips up to the second quarter of next year is the 672—this is a 3.80GHz processor with 2MB of cache using an 800MHz frontside bus. It will support Intel's Vanderpool virtualization technology, Hyper-Threading, Speedster, the XD bit to partially prevent viral infestation, and 64-32 bit processing.

Then there are the dual-core chips, none of which will offer much in the way of raw performance, but which will eventually displace all single-core processors for desktops. The jury is still out on dual-core chips. AMD's Toledo dual-core processors (with the "X2" moniker) are slated to appear in the early third quarter of this year and the dual-core Opterons will have already launched as you read this. It's generally agreed that it's the design of AMD's dual-core chips that will make them, for the time being, superior to Intel's offerings, particularly for gamers and enthusiasts. A combination for raw performance and price are likely to make these attractive for people who want to buy high-end desktop systems.

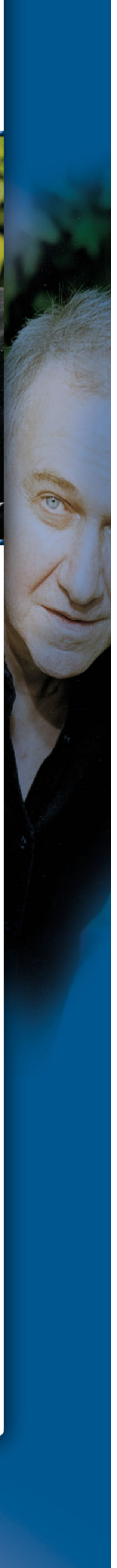
So, Intel is essentially treading water on its desktop processors while its engineers and architects work overtime to come up with new technology that will really give AMD a sharp jolt in the performance stakes. We're unlikely to see chips using this technology until the end of next year. Until then, Intel will work on adding features to its existing Pentium M and Pentium families, and the mantra is dual cores everywhere.

By the end of next year, both AMD and Intel will offer dual-core processors for desktop and for notebook systems, but it's not going to end there. According to sources close to both companies, we'll see quad-core systems from both companies during 2007, meaning, in theory at least, unimaginable power on your desktop and even your notebook for that matter. These chips will support massive amounts of memory and will be able to take advantage of software applications designed to work with 64-32 bit addressing and dual-core tech.

While the two chip teams battle it out with each other, there is a quiet revolution happening. Intel has now consigned its 64-bit Itanium to the rarefied regions of the mainframe market. Software vendors were reluctant to spend vast amounts of money porting their 32-bit applications to 64-bits while the market for the Itanium processor was so small. But when Intel followed AMD by adopting its 64-32 bit design, the same software app vendors began to sniff a real opportunity. Over the last few months we've seen several software companies announce they're porting their applications for Intel's EM64T and for AMD64. That trend will accelerate for the rest of this year and into 2006 and 2007. That gives the possibility of some real gains in terms of the software we'll be running on our machines. If Microsoft only delivers a quarter of what it's already promising for Longhorn, this means that finally we may have something to get excited about, with grown up games, multimedia, and other apps taking advantage of all this awesome chip power. ▲

> . . . we'll see quad-core systems from both companies during 2007. . .

Send rumours to "Mad Mike" Magee at Mike@cpumag.com.



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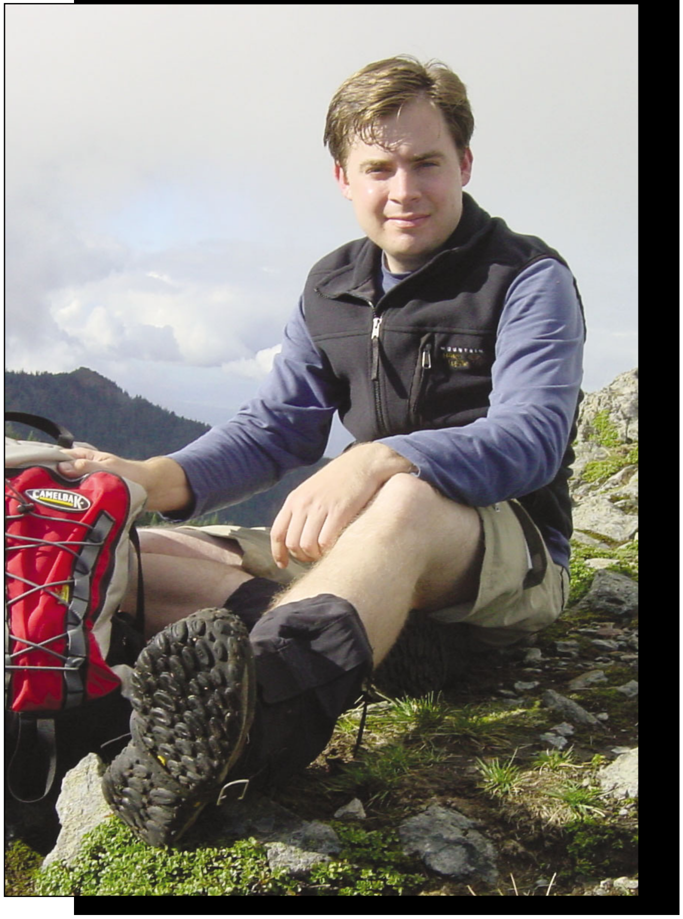
Technically Speaking

An Interview With Jeremy Irish, President Of Groundspeak



In five years, geocaching has risen from nothing to a phenomenon that's enjoyed in more than 200 countries. The idea is simple: Use your GPS device to find hidden treasure. But while looking up GPS coordinates is easy, getting to the location where satellites mark the spot can be something else entirely. Jeremy Irish, president of Groundspeak, is the head of an eight-person team that makes geocaching a uniquely entertaining reality for hundreds of thousands of people. If there is even a hint of Indiana Jones in you, this is one high-tech sport you don't want to miss out on.

by William Van Winkle

CPU: Can you describe what the origins of geocaching are?

Irish: Before May 2000, something called selective availability affected signals in such a way that a civilian-grade GPS receiver would only get about 300-foot accuracy. The Clinton administration realized the usefulness of GPS, so it removed selective availability, and instantly all the GPS receivers around the world had 20-foot accuracy. There were a bunch of GPS aficionados at the time, one of which was Dave Ulmer. Dave Ulmer posted a note in a newsgroup online and said, 'I'm placing this container out in the woods and posting its coordinates online. If you find this container, take an item, leave an item, and write it in the log book.' And that was pretty much it. He placed it outside of Portland, Ore., and it was found four days later by Mike Teague. Mike Teague started documenting the container locations that other people were posting in the newsgroup that they called, at that time, stashes.

I got involved about four months later. At that time there were only about 50 caches in the world. I was working for a failing dot com and looking for a distraction. A co-worker came into the office with a Garmin eTrex, and I took it outside to play with it. I didn't realize that there were handheld-capable GPS receivers at the time, so I got excited about it. I came across Mike Teague's Web site and found out that there was one in my state only about an hour-and-a-half drive from my house, so I bought a GPS receiver and that weekend I went out and found it.

On my way back down from the trail, I was thinking about how to make the game easier. I used my Web-development skills to put together a site, approached Mike Teague, and at that point I think there were two or three caches that he was trying to list on his Web site per week. He said, 'You know, this really isn't my cup of tea. I want to pass this on to you. You're doing a great job with the Web site.' And he gave me some hints on how to make the site easier and passed the baton to me in August 2000. At that point I launched the site with 75 caches listed. From there we were Slashdotted, and then CNN picked up on the Slashdot.

CPU: What was in that first cache that you found?

Irish: I found a yellow 3 x 5 card box. Inside was a Sunny Delight drink, which is one of the reasons why we say no food in caches. It wasn't very appetizing. And it had a disposable camera in it, which I thought was a pretty novel idea. A lot of people still do that today. They go develop it at the end to see who went to the cache. And that was pretty much it, plus a log book and a pencil. It was a really straightforward kind of basic cache. And it was probably one of the worst hikes I've ever done. It was a hot day, unusually warm for the Pacific Northwest. The bugs were out in droves, and I ran out of water about halfway through, so we had to go down to a lake and filter some water. It was just miserable, but when we got to the location and found the container, we were so excited by it, just the possibility of finding this thing, that it made the whole hike worth it. I thought, you know, if I can have a crappy hike and have a really enthusiastic experience finding a 3 x 5 card box in the woods, then this must be something that may be popular to other people.

CPU: Are there limits to how hard geocaches can be to find?

Irish: Well, there's really no limit in the game, and there are really only a few general rules. It's not a competition because there is no starting point and ending point and time period. It's more of a day-tripping activity, but it can entail some pretty difficult puzzles, difficult hikes. We rate cache locations by difficulty and terrain, and difficulty can be from a puzzle or the clever way that it was hidden, so there are varying degrees of difficulty. And then terrain is from wheelchair accessible to special equipment.

> "It is very hard to categorize the kind of person who goes out geocaching because there are so many variations on the activity."
>
> -Jeremy Irish

CPU: What is it that made you gravitate to geocaching so much?

Irish: I was a Boy Scout—one of the many millions who never made Eagle. I did a lot of hiking and camping when I was a kid, but then there was this point where I got out of college and into the real world, started working in technology, and I did less and less hiking and outdoors stuff. There was a point when I was working in Maryland, where for a whole week I would drive from a garage to a parking garage and I would never actually be outside. So when I was burning out at this dot com, I thought it was a way to combine the two things I found exciting, the outdoors and technology, and actually get some exercise at the same time. I also like the idea of working on a Web site that makes you turn off your computer and go outside. When people talk about gaming, it's Xbox, PlayStation, Nintendo, that kind of thing. Sitting indoors, watching TV, sticking you in your living room, that's what most companies focus on these days. That's one of the major reasons why I work on this. It's fun to work with technology, but I have the goal of getting people to go outside.

CPU: Can you generalize about the kind of person who's really interested in geocaching, or does it just draw out all types?

Irish: It is very hard to categorize the kind of person who goes out geocaching because there are so many variations on the activity. Somebody did some research a couple years ago and determined it's actually a median age of about 38. So it's an older crowd than I initially expected. And most of them have kids between the ages of six and 12. It's usually young families going out and geocaching. It's also a way for people to see interesting and unusual locations around the U.S. Some people vacation now and go geocaching. A lot of people geocache as part of some other activity; like they might be flying to Vegas, but while they're in Vegas at a convention, they might go out of the city and do some hikes and find some caches.

CPU: Any plans or ideas on how you can expand the business beyond what you are already offering?

Irish: We have some projects in the works that we can't announce prior to releasing them. But in general terms, the idea of using GPS for things other than turn-by-turn directions is huge. There are so many opportunities, especially in the world of entertainment. I think that's like the next big thing.

CPU: Do you have an example?

Irish: Well, the PlayStation Portable and Nintendo DS and the small company Gizmondo that's coming out, all those have indicated that they're going to be adding GPS. Gizmondo actually has built-in GPS. It came out with a game called Colors, which I would actually say is kind of a bad idea. It's like urban warfare. You create a gang. I'm learning a bit more about it. It hasn't launched the device yet, but the game involves building up funds, and then you're able to kind of own areas of a city. While other people are using their Gizmondo and they walk through that area, they can battle it out with other gangs. It's an interesting concept but badly conceived, sort of like [sounding] interesting in a meeting room but in application it sounds a little dangerous. But the fact that it is into GPS as entertainment is exciting.

CPU: Does geocaching activity vary by season or some other variable?

Irish: Somewhat. After January everybody gets new GPS receivers, and the traffic on the site just blows up. It's amazing. We have this huge growth in the first three months of the year, which is surprising, being as it's also the coldest time of the year.

Subscribers can read bonus content with Jeremy Irish at
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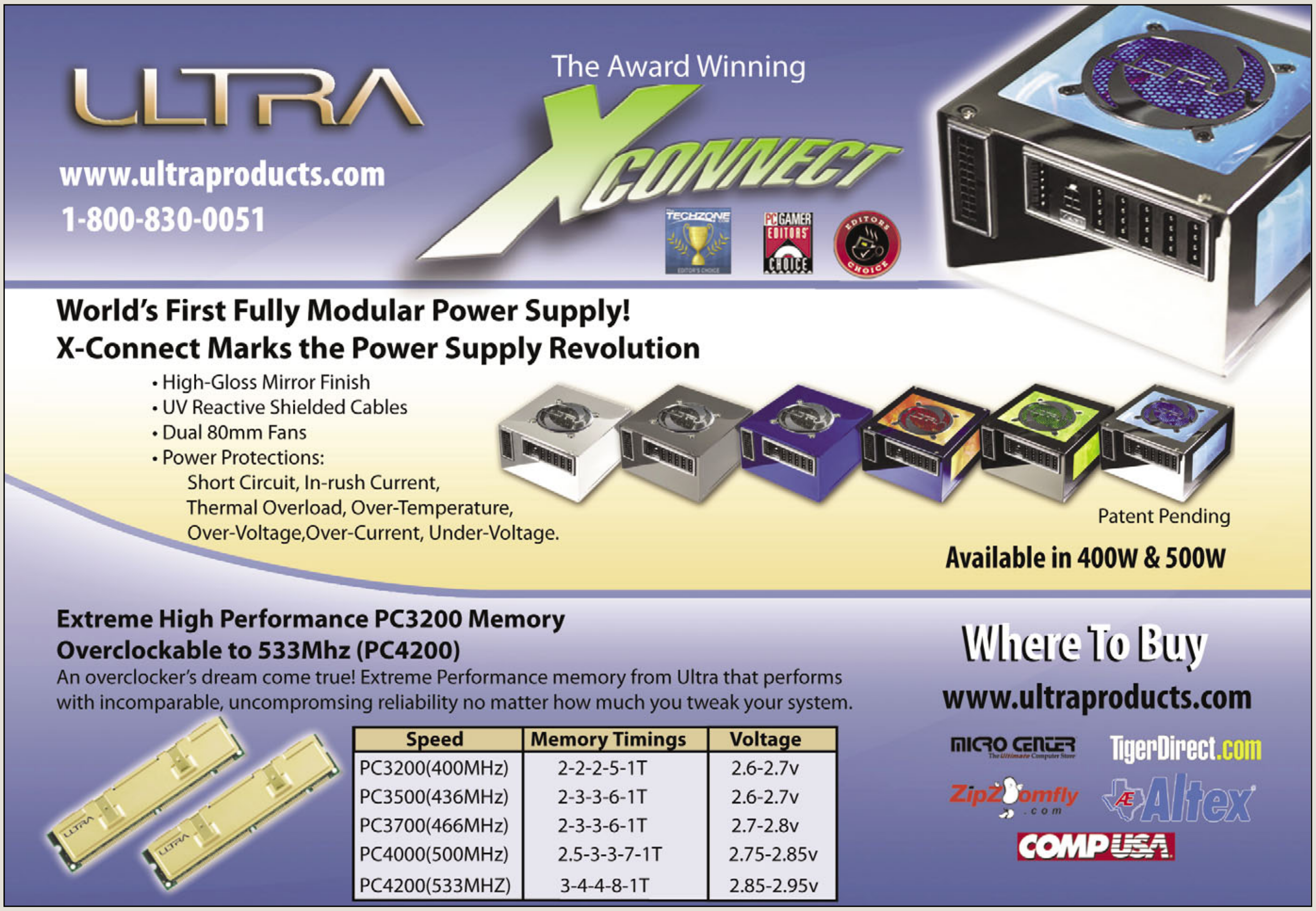

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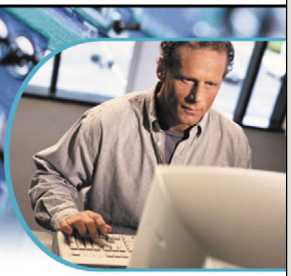

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by William Van Winkle

Under Development

A Peek At What's Brewing In The Laboratory

A Picture Worth A Thousand (Pass)words

We increasingly rely on cell phones and PDAs to store sensitive information and data, and not just phone numbers and addresses but financial records, passwords, and documents. Text passwords and key locks provide some basic security, but they are generally used inconsistently, leaving information vulnerable if the device falls into nefarious hands.

Enter the OKAO Vision Face Recognition Sensor developed by Japan's OMRON Corporation. Designed to be incorporated into camera-equipped handhelds, the biometric technology secures a device by requiring users to photograph themselves before using it. The photo is compared against faces registered in an onboard database. If a match is authenticated, the device unlocks for use in about one second.

The OKAO Sensor's requirements are modest. No additional hardware is needed beyond a camera-equipped device that is capable of capturing images at 320 x 240, and each registered photo requires only 1.5KB of storage. The software will be available for Symbian OS, BREW, embedded Linux, and ITRON OSes.

Sure, the cool factor is high, especially if you enjoy photographing yourself, but does the technology really work with notoriously lame camera phone imaging? In OMRON's testing the OKAO Vision Face Recognition Sensor produced a 99% success rate in identifying an authorized user under various lighting and focus conditions, including the ability to recognize a rotated image.

The technology was recently demonstrated at the 2005 Security Show in Tokyo, but OMRON is still mum on a specific timeline when it might be widely available to consumers, claiming that availability will depend entirely on cell phone manufacturers. ▲

処理時間: 980 ms
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戻る
決定

Is It Live Or . . . ?

The blending of live-action video and computer-generated images is so commonplace these days, it's almost cliché. Adding computer effects to film in the studio is a no-brainer, but a live broadcast is a much more difficult prospect.

Researchers at Oxford's Department of Engineering Science are developing a new camera navigation technology that will allow computer-generated images to be added to live video footage in real time.

Existing systems that superimpose graphics over live-action video require a lot of calibration ahead of time, with external markers placed on the scene to ensure accurate positioning of the overlaid graphics (a la SportsVision's yellow first-down line seen during football broadcasts). In contrast, the Oxford system requires only one object of known size to be placed in the scene for calibration. From there it can build a detailed visual map on the fly, using existing landmarks as reference points.

The system uses a handheld camera connected to a computer. As the camera moves, software measures how the distance from the camera to the reference points changes, letting it accurately estimate the camera's location and movement in relation to the surrounding environment, a process called SLAM (Simultaneous Localization and Mapping). With this data graphics can be accurately overlaid onto the live scene.

"This localization and mapping technology turns a camera into a flexible, real-time position sensor," says Dr. Andrew Davidson, a principal researcher on the project.

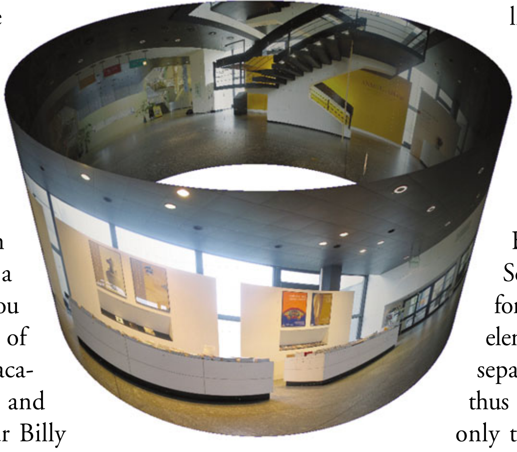
In addition to TV and video entertainment—think of adding graphics to broadcasts of sporting events, concerts, and other live events—the technology could be used to virtually redecorate a room, adding furniture and more to the image your DV camcorder captures. The researchers are also working with Japan's AIST Research Institute to use the technology in a navigation system for humanoid robots. ▲

Take A Look Around

Wish you could browse a favorite Swedish furniture store without having to deal with hundreds of other shoppers doing the same? Ever arrived at your vacation resort only to find that what looked quaint and quiet in the brochures was actually right next to a noisy six-lane highway? If so, take heart.

Researchers at the Fraunhofer Institute for Telecommunications in Berlin are developing a system that could put you virtually in the middle of these scenes, ending vacation planning mishaps and letting you choose your Billy bookcase in peace.

The Virtual Reality Showroom can display physical environs as high-resolution, cylindrical, 360-degree panoramas, providing a complete view of a virtual scene all around its axis. Although such panoramas are nothing new—witness the "virtual reality home tours" now seen on most realty sites—the Fraunhofer Institute's system expands on existing technology, using image data that allows for the embedding of video, interactive scene elements, and 3D audio.



The system includes several algorithms to optimize virtual scenes. One algorithm can stitch together video and digital images seamlessly, adjusting lighting and exposure as needed. Another can insert still images in scenes, thus creating action, say of a crowd of people or cars passing by. Using MPEG-4 BIFS (Binary Format for Scenes) architecture allows for each of the multimedia elements to be processed as separate, individual objects, thus decreasing access time as only the elements being currently viewed are loaded.

The addition of these elements brings the environments to life and lets users interact with virtual scenes in ways not possible before. For example, in a showroom scene, a shopper could filter out those items that are not of a certain brand or style, zoom in on an item of interest and view it from several angles, or access additional product information that the vendor has embedded.

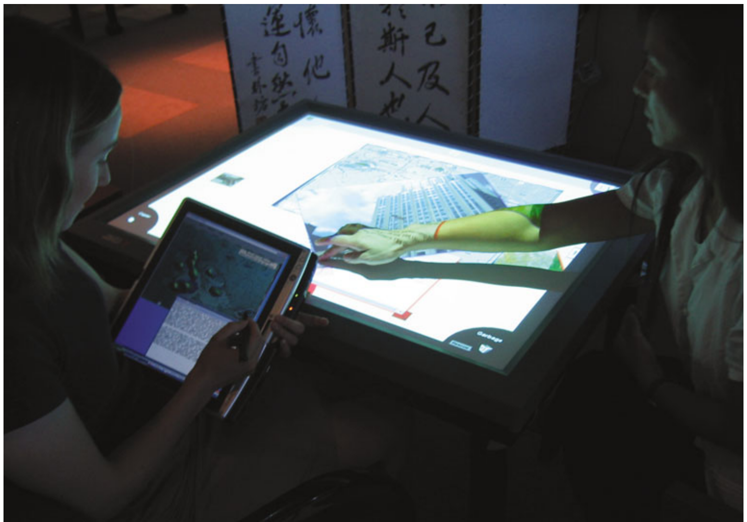
"The customer can interactively create a personalized shopping atmosphere among the goods that are on show," said Fraunhofer's Peter Eisert in a recent release.

The travel industry could also benefit from application of this technology. An agent might use such a system to give customers a walkthrough tour of their intended destination, with 3D audio letting them hear just how loud the surf (or interstate) is from their suite. ▲

Tabula Digital

Imagine if you and a colleague could sit at an electronic tabletop, transfer a document to it from your laptop, edit it on the table's surface using fingers or a stylus, and then transfer the document back to your laptop and be on your way.

Making this a reality is the focus of the UbiTable project at MERL (Mitsubishi Electric Research Laboratories) in Cambridge, Mass. Chia Shen, senior research scientist and associate director at the lab, and her team are developing tools that will let users work with digital docs and images on an interactive tabletop as they might with hard copies on a traditional table.



Shen says one challenge in bringing a digital tabletop to fruition is in the area of user interface and computer/human interaction. "Once people can sit or stand around a tabletop, and when everyone around the table can interact [with digital content] in parallel and simultaneously, the rules of the game change drastically."

To that end, the team has developed the UbiTable (Ubiquitous Table). Still in the prototype stage, the UbiTable software provides an interface that lets users move content fluidly and easily from personal devices to the shared workspace of the interactive tabletop. Once on the table, a finger slide can move and rotate the content. The content can also be marked up with digital ink, resized, and copied.

The Mitsubishi DiamondTouch, a "simultaneous, multiuser, touch-sensitive input device" scheduled to be commercially available in May 2005, runs the UbiTable. Four users can connect their notebooks via USB, and the table tracks which user is touching where via embedded antennas that transmit a unique signal to a receiver on the user's chair.

Beyond workplace applications the team sees a time when interactive tabletops could be available for walkup use in public spaces, such as cafes and airports or anyplace people meet for impromptu face-to-face collaboration. ▲

Q&A with Nolan Bushnell

Nolan Bushnell emerged from the 1975 to 1985 era as one of the most famous, daring, imaginative, and assaulted figures in technology. His rise to fame came with the founding of Atari, and with it, legendary games ranging from Pong to Asteroids, followed by the quarter-guzzling kiddie juggernaut, Chuck E. Cheese's Pizza Time Theater. All told, Bushnell has helped to found more than 20 companies. Now he's back and ready to take another stab at stardom.

Q Where did the name Atari come from?

NB I was a Go player, which is a Japanese game. "Atari" is the warning to your opponent that you're about to be engulfed.

Q How did you decide on Pong to be your lead game?

NB I saw the Magnavox [Odyssey] machine after I'd already sketched out a basic Ping-Pong game. After seeing the Magnavox, I said, 'This [table tennis] game isn't particularly fun, but I think I can make it fun.' I put an engineer on the project, just doing this basically as a throwaway. I never thought that Pong would be commercially viable for the coin-operated game business. It wasn't until after we had it up and going, with the scoring and a few things, when I said, 'You know this just might have some merit to it.'

Q With little money, you dedicated a full-time programmer to work on this, not thinking it was going to be commercially viable?

NB Pong took him a week. It was a learning process. I wanted him to learn how the technology worked, and that was the simplest game I could think of.

Q At what point did you know it was time to get out of Atari?

NB Wall Street didn't think that the game business was serious business. We didn't have a penny of venture capital until we were $40 million in sales. So when we moved to the consumer marketplace, I just didn't feel like I could fund it. Instead I thought I could sell the company for more money than I ever thought I would make and did so.

Q You sold to Warner Communications before the 2600?

NB It was being designed while I was there, and we had it all ready, but I just knew we didn't have enough money to put it into the marketplace.

Q Being a parent, do you feel there's such a thing as excessive or counterproductive gaming?

NB Absolutely. In fact, there's some pretty good evidence that excessive game play is not good for kids, but moderate game playing is extremely good for kids. You find kids are much better problem solvers. They've shown some actual jumps in measured IQ for game players. But if they start exceeding two hours a day, then you see a serious drop off in other knowledge acquisition. I try very hard to limit my kids to two hours.

Q What is your current company, uWink, all about?

NB uWink has a very neat network game technology. It enables very robust systems that can be connected to a network and not administered, except remotely. Then we're about to move into a thing called the uWink Media Bistro, which is a Chuck E. Cheese for adults with a whole bunch of new trick technology. Every table has a swivel-mounted touchscreen, on which you not only order your food, but you can choose up to 20 sporting events to watch, dial in your favorite music video, play trivia, or play any of the games that we have. You can talk to other tables. In the bar we have multiplayer games where groups can compete. The whole interior of the place is made to be a video screen, so there's media everywhere.

Q It's been 30 years since Atari; are you ready to do that grind all over again to succeed?

NB Well, sure. It's always irritated me that the technology has progressed so far and yet Chuck E. Cheese is still the same. I've always felt, 'Why should the kids get all the fun?' You know, Chuck E. Cheese is the most profitable restaurant in the public markets by a long ways. And this will be better. It will be the most profitable and fastest-growing restaurant chain in the world.

Subscribers can go to www.cpumag.com/cpujune05/bushnell for bonus content.

William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside Portland, Ore.

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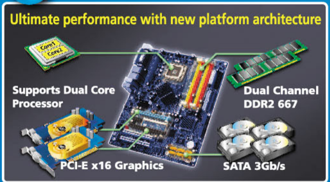

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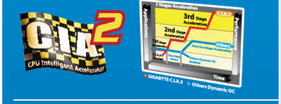
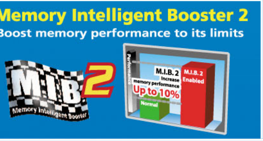


Memory Intelligent Booster 2

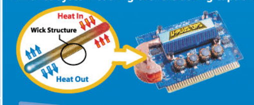
Boost memory performance to its limits

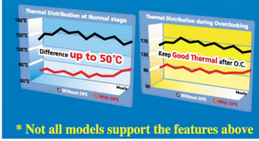


Security DNA

U-Plus D.P.S.*

Enhance system cooling & overclocking capability

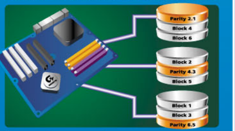




* Not all models support the features above

RAID5

Smart protection & improved data access



Intel® Execute Disable Bit

Intel XD Bit

Protects system from virus attacks

Xpress Recovery

BIOS Xpress Recovery

Instantly recovers system files back to normal

GA-8I955X Royal

Dual Core Processor | Dual Channel DDR2 888 | PCI Express | Serial-ATAII RAID | Dual Gigabit LAN | Dual RAID

Intel® 955X Express Chipset | Designed for Dolby Master Studio | Intel® Matrix Storage Technology

- **Intel® 955X Express Chipset + ICH 7R**
- Optimized for Intel Pentium Processor Extreme Edition
- Supports dual channel DDR2 667 with ECC up to 8GB
- Features GIGABYTE exclusive U-Plus D.P.S.
- Features dual Gigabit Ethernet port connection
- Integrated new generation SATA 3Gb/s storage interface
- Features with Intel Matrix Storage Technology
- Designed for Dolby Master Studio

Free!

GN-BTD02 *Bluetooth USB Dongle included!!*

GIGABYTE Patented
U-Plus D.P.S. included!!

GA-8I945P Pro

Dual Core Processor | Dual Channel DDR2 888 | 64-Bit Ready | Dual RAID | Gigabit LAN | IEEE 1394b | Intel High Definition Audio

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- Supports Intel® Pentium® D Processor
- Supports new generation dual channel DDR2 667 memory architecture
- Integrated new generation SATA 3Gb/s storage interface
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- Features 7.1 channel Intel High Definition Audio

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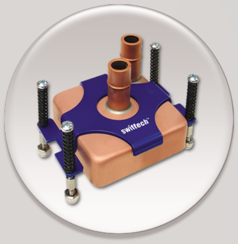


Swiftech MCW6002-PX™ Water Block

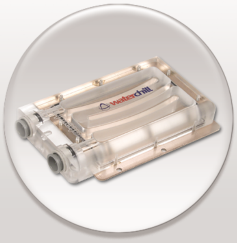
Koolance F-Splitter 3/8" to 1/4"

Thermaltake 208 Copper CPU Waterblock

120mm Red Master Dragon Fan Grill - Hand Painted

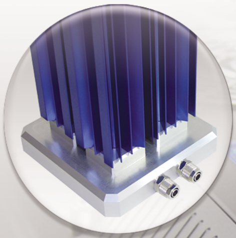
A.C. Ryan Ryanpower2 450W Modular Power Supply

Thermaltake Armor Case - Silver



Asetek WaterChill Hard Drive Cooler 3 1/2" Bay

Thermaltake 207 Water Level Indicator



Innovatek HTCS Convection Radiator

Koolance Exos-2 SILVER

Wintsch Labs Arctic Spider Liquid Cooled 437W Thermoelectric Assembly (GeForce 6800)